BIOFABRICATION APPROACHES WITH HYALURONIC ACID HYDROGELS FOR CARTILAGE

REPAIR

Jonathan H. Galarraga

Permissions for Copyrighted Materials

Figure 1.1

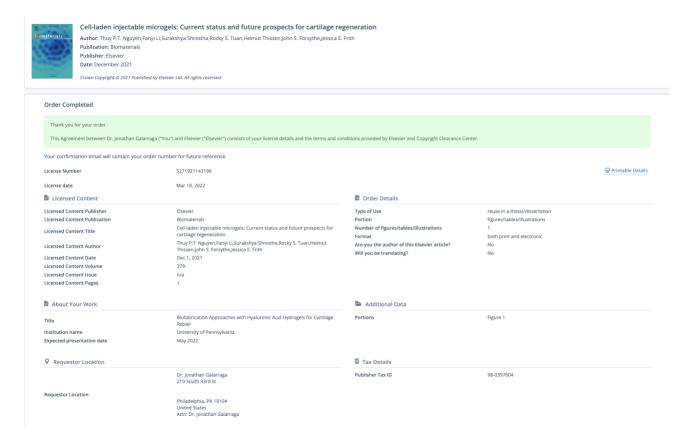


Figure 1.2



25th Anniversary Article: Engineering Hydrogels for Biofabrication

Author: Jos Malda, Jetze Visser, Ferry P. Melchels, et al Publication: Advanced Materials Publisher: John Wiley and Sons Date: Aug 23, 2013

© 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference. License Number Printable Details 5271921471569 License date Mar 18, 2022 Licensed Content Order Details Licensed Content Publisher Licensed Content Publication University/Academic Advanced Materials Requestor type 25th Anniversary Article: Engineering Hydrogels for Biofabrication Jos Malda, Jetze Visser, Ferry P. Melchels, et al Format Portion Licensed Content Title Print and electronic Licensed Content Author Figure/table Number of figures/tables Licensed Content Date Aug 23, 2013 Licensed Content Volume Will you be translating? Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania Institution name May 2022 Expected presentation date Requestor Location ■ Tax Details

Publisher Tax ID

EU826007151

Dr. Jonathan Galarraga 210 South 33rd St

Requestor Location

Figure 1.3a



Bioprinting Complex Cartilaginous Structures with Clinically Compliant Biomaterials

Author: Matti Kesti, Christian Eberhardt, Guglielmo Pagliccia, et al Publication: Advanced Functional Materials Publisher: John Wiley and Sons

Date: NOV 19, 2015

© 2015 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Order Completed Thank you for your order. This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center. Your confirmation email will contain your order number for future reference. License Number 5271930069250 Printable Details License date Mar 18, 2022 Licensed Content Order Details Type of use Requestor type Format Portion Number of figures/tables Will you be translating? John Wiley and Sons Advanced Functional Materials Bioprinting Complex Cartilaginous Structures with Clinically Compliant Biomaterials Licensed Content Publisher University/Academic Print and electronic Licensed Content Title Figure/table Licensed Content Author Matti Kesti, Christian Eberhardt, Guglielmo Pagliccia, et al Licensed Content Date Licensed Content Volume Nov 19, 2015 25 Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair Figure 4 Portions Institution name University of Pennsylvania Expected presentation date May 2022 Requestor Location ■ Tax Details Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID EU826007151 Requestor Location Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Figure 1.3b



Order Date Order License ID ISSN	18-Mar-2022		
	1201155-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
LICENSED CONTENT			
Publication Title	Biofabrication	Country	United Kingdom of Great Britain and
Author/Editor	Institute of Physics (Great Britain)		Northern Ireland
Date	01/01/2009	Rightsholder	IOP Publishing, Ltd
Language	English	Publication Type URL	e-Journal http://iopscience.iop.org/1758-5090
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
Number of charts / graphs / tables /	3	Translation	Original language of publication
igures requested		Copies for the disabled?	No
Format (select all that apply)	Print, Electronic	Minor editing privileges?	Yes
Who will republish the content?	Academic institution	Incidental promotional use?	No
Duration of Use	Life of current edition	Currency	USD
ifetime Unit Quantity	Up to 499		
Rights Requested	Main product		
NEW WORK DETAILS			
Title	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
nstructor name	Jonathan H. Galarraga	Expected presentation date	2022-03-10
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
REUSE CONTENT DETAILS			
	Figures 1,2,4	Title of the article/chapter the portion is from	Bioprinting of hybrid tissue constructs tailorable mechanical properties
			canorable incentament properties
litle, description or numeric reference of he portion(s) Editor of portion(s)	Jonathan H. Galarraga	Author of portion(s)	Institute of Physics (Great Britain)
he portion(s)	Jonathan H. Galarraga N/A		an account which is not been a second to the

Figure 1.3c

A 3D bioprinting system to produce human-scale tissue constructs with structural integrity

Author: Hyun-Wook Kang et al SPRINGER NATURE

Publication: Nature Biotechnology Publisher: Springer Nature Date: Feb 15, 2016

Copyright © 2016, Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.

Order Completed

License Number

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and Springer Nature ("Springer Nature") consists of your license details and the terms and conditions provided by Springer Nature and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference.

License date Mar 18, 2022 Licensed Content Licensed Content Publisher Springer Nature Springer Nature
Nature Biotechnology
A 3D bioprinting system to produce human-scale tissue constructs with
structural integrity
Hyun-Wook Kang et al
Feb 15, 2016 Licensed Content Publication

5271930188296

Licensed Content Title

Licensed Content Author Licensed Content Date

About Your Work Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair Title

University of Pennsylvania Expected presentation date May 2022

Q Requestor Location Dr. Jonathan Galarraga 210 South 33rd St

Requestor Location

Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Order Details

Type of Use Thesis/Dissertation Requestor type Format academic/university or research institute print and electronic Portion
Number of figures/tables/illustrations figures/tables/illustrations

Printable Details

High-res required
Will you be translating? Circulation/distribution
Author of this Springer Nature content 1 - 29

Additional Data

Figures 1, 5 Portions

Tax Details

Figure 1.3d



In situ handheld three-dimensional bioprinting for cartilage regeneration

Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Author: Claudia Di Bella, Serena Duchi, Cathal D. O'Connell, et al Publication: Journal of Tissue Engineering and Regenerative Medicine Publisher: John Wiley and Sons Date: Aug 25, 2017

Copyright © 2017 John Wiley & Sons, Ltd.

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference. Printable Details License Number 5271930300315 License date Mar 18, 2022 Licensed Content Drder Details Licensed Content Publisher Journal of Tissue Engineering and Regenerative Medicine Licensed Content Publication Requestor type University/Academic Format
Portion
Number of figures/tables Licensed Content Title Licensed Content Author In situ handheld three-dimensional bioprinting for cartilage regeneration
Claudia Di Bella, Serena Duchi, Cathal D. O'Connell, et al Print and electronic Figure/table Licensed Content Date Aug 25, 2017 Will you be translating? Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania Title Expected presentation date May 2022 **♀** Requestor Location Tax Details Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID EU826007151

Figure 1.3d



This is a License Agreement between University of Pennsylvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below. All payments must be made in full to CCC in accordance with the CCC Terms and Conditions below.

Order License ID 1201061-1 1758-5090 Type of Use Publisher Portion

Republish in a thesis/dissertation IOP Publishing Image/photo/illustration

Publication Title Author/Editor

Biofabrication Institute of Physics (Great Britain) 01/01/2009

Image/photo/illustration

English

Country

United Kingdom of Great Britain and Northern Ireland

IOP Publishing, Ltd Rightsholder

Publication Type e-Journal

http://iopscience.iop.org/1758-5090 URL

Date

Language

Portion Type Number of images / photos / illustrations Format (select all that apply)

Print, Electronic Who will republish the content? Academic institution **Duration of Use** Life of current edition Lifetime Unit Quantity Up to 499

Distribution Translation

Original language of publication

Copies for the disabled? Minor editing privileges? Yes Incidental promotional use? No USD Currency

Rights Requested Main product

NEW WORK DETAILS

Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair

Jonathan H. Galarraga

Expected presentation date

University of Pennsylvania

2022-05-16

United States

ADDITIONAL DETAILS

Instructor name

Order reference number

N/A

The requesting person / organization to appear on the license

University of Pennsylvania

Title, description or numeric reference of the portion(s)

Editor of portion(s)

Volume of serial or monograph Page or page range of portion

Figure 1

Jonathan H. Galarraga

N/A 3

Title of the article/chapter the portion is

from

Author of portion(s)

Issue, if republishing an article from a

Publication date of portion

Development of the Biopen: a handheld device for surgical printing of adipose stem cells at a chondral wound site

Institute of Physics (Great Britain)

2022-05-16

Figure 1.4a



Fiber Reinforced Cartilage ECM Functionalized Bioinks for Functional Cartilage Tissue Engineering

Author: Swetha Rathan, Léa Dejob, Rossana Schipani, et al Publication: Advanced Healthcare Materials Publisher: John Wiley and Sons Date: Jan 9, 2019 © 2019 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

 $Your \ confirmation \ email \ will \ contain \ your \ order \ number \ for \ future \ reference.$

Printable Details License Number 5271930410649 Mar 18, 2022 Licensed Content Order Details Type of use Requestor type Format Licensed Content Publisher John Wiley and Sons jonn viney aru soro.
Advanced Healthcare Materials
Fiber Reinforced Cartilage ECM Functionalized Bloinks for Functional
Cartilage Tissue Engineering
Swetha Rathan, Léa Dejob, Rossana Schipani, et al University/Academic Print and electronic Licensed Content Publication Licensed Content Title Portion Number of figures/tables Will you be translating? Figure/table Licensed Content Author Licensed Content Date Licensed Content Volume Jan 9, 2019 8 Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania Figure 5 Title Expected presentation date May 2022 Requestor Location Tax Details Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID EU826007151

Figure 1.4b



This is a License Agreement between University of Pennsylvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below.

All payments must be made in full to CCC i	n accordance with the CCC Terms and Condition	s below.	
Order Date Order License ID ISSN	18-Mar-2022 1201160-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
LICENSED CONTENT			
Publication Title	Biofabrication	Country	United Kingdom of Great Britain and Northern Ireland
Author/Editor	Institute of Physics (Great Britain)	Rightsholder	IOP Publishing, Ltd
Date	01/01/2009	Publication Type	e-Journal
Language	English	URL	http://iopscience.iop.org/1758-5090
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
Number of charts / graphs / tables /	2	Translation	Original language of publication
figures requested		Copies for the disabled?	No
Format (select all that apply)	Print, Electronic	Minor editing privileges?	Yes
Who will republish the content?	Academic institution	Incidental promotional use?	No
Duration of Use	Life of current edition	Currency	USD
Lifetime Unit Quantity Rights Requested	Up to 499 Main product		
rights requested	Main product		
NEW WORK DETAILS			
Title	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
Instructor name	Jonathan H. Galarraga	expected presentation date	2022 03 10
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
REUSE CONTENT DETAILS			
Title, description or numeric reference of the portion(s)	Figures 1,5	Title of the article/chapter the portion is from	A biofabrication method to align cells within bioprinted photocrosslinkable and
Editor of portion(s)	Jonathan H. Galarraga		cell-degradable hydrogel constructs via embedded fibers
Volume of serial or monograph	N/A	Author of portion(s)	Institute of Physics (Great Britain)
Page or page range of portion	3,12	Issue, if republishing an article from a serial	N/A

Publication date of portion

Figure 1.4c

 $\label{lem:composite} A \ biomimetic \ three-dimensional \ woven \ composite \ scaffold \ for \ functional \ tissue \ engineering \ of \ cartilage$

SPRINGER NATURE

Requestor Location

Author: Franklin T. Moutos et al Publication: Nature Materials Publisher: Springer Nature Date: Jan 21, 2007

Copyright © 2007, Nature Publishing Group

Order Completed					
Thank you for your order. This Agreement between Dr. Jonathan Galarraga ("You") and Springer Nature ("Springer Nature") consists of your license details and the terms and conditions provided by Springer Nature and Copyright Clearance Center.					
Your confirmation email will contain your order number	per for future reference.				
License Number	5271930541050			Printable Details	
License date	Mar 18, 2022				
Licensed Content		Order Details			
Licensed Content Publisher Licensed Content Publication Licensed Content Title Licensed Content Author Licensed Content Date	Springer Nature Nature Materials A biomimetic three-dimensional woven composite scaffold for functional tissue engineering of cartilage Franklin T. Moutos et al jan 21, 2007	Type of Use Requestor type Format Portion Number of figures/tables/fillustrations High-res required Will you be translating? Circulation/distribution Author of this Springer Nature content Additional Data	Thesis/Dissertation academic/university or research institute print and electronic figures/tables/illustrations 2 no no 1 - 29 no		
Title Institution name Expected presentation date © Requestor Location	Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania May 2022	Portions Tax Details	Figures 1,2		
	Dr. Jonathan Galarraga 210 South 33rd St				

Figure 1.4d



$Enhancing \ structural \ integrity \ of \ hydrogels \ by \ using \ highly \ organised \ melt \ electrospun \ fibre \ constructs$

Author: Onur Bas, Elena M. De-Juan-Pardo, Mohit P. Chhaya, Felix M. Wunner, June E. Jeon, Travis J. Klein, Dietmar W. Hutmacher Publication: European Polymer Journal Publisher: Elsevier

Date: November 2015

Copyright © 2015 Elsevier Ltd. All rights reserved.

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and Elsevier ("Elsevier") consists of your license details and the terms and conditions provided by Elsevier and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference.

Your confirmation email will contain your	order number for future reference.			
License Number	5271930632706			ল্লি Printable Details
License date	Mar 18, 2022			
Licensed Content		Order Details		
Licensed Content Publisher Licensed Content Publication	Elsevier European Polymer Journal	Type of Use	reuse in a thesis/dissertation figures/tables/illustrations	
Licensed Content Title	Enhancing structural integrity of hydrogels by using highly organised melt electrospun fibre constructs	Number of figures/tables/illustrations	2 both print and electronic	
Licensed Content Author	Onur Bas, Elena M. De-Juan-Pardo, Mohit P. Chhaya, Felix M. Wunner, June E. Jeon, Travis J. Klein, Dietmar W. Hutmacher	Are you the author of this Elsevier article? Will you be translating?	No	
Licensed Content Date	Nov 1, 2015	Will you be translating?	No	
Licensed Content Volume	72			
Licensed Content Issue	n/a			
Licensed Content Pages	13			
About Your Work		Additional Data		
Title	Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair	Portions	Figures 3,4	
Institution name	University of Pennsylvania			
Expected presentation date	May 2022			
Requestor Location		Tax Details		
	Dr. Jonathan Galarraga 210 South 33rd St	Publisher Tax ID	98-0397604	
Requestor Location	Dhiladalahia DA 10104			

Figure 1.4e



Simultaneous Micropatterning of Fibrous Meshes and Bioinks for the Fabrication of Living Tissue Constructs

Author: Mylène de Ruijter, Alexandre Ribeiro, Inge Dokter, et al Publication: Advanced Healthcare Materials Publisher: John Wiley and Sons Date: Jun 17, 2018

 $@\ 2018\ The\ Authors.\ Published\ by\ WILEY-VCH\ Verlag\ GmbH\ \&\ Co.\ KGaA,\ Weinheim$

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference.

Printable Details License Number 5271930731955 License date Mar 18, 2022 Licensed Content Order Details Type of use
Requestor type
Format
Portion
Number of figures/tables Dissertation/Thesis University/Academic Print and electronic Licensed Content Publisher Licensed Content Publication John Wiley and Sons Advanced Healthcare Materials Simultaneous Micropatterning of Fibrous Meshes and Bioinks for the Fabrication of Living Tissue Constructs Licensed Content Title Mylène de Ruijter, Alexandre Ribeiro, Inge Dokter, et al Jun 17, 2018 Licensed Content Author Licensed Content Date Will you be translating? Licensed Content Volume Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair Figure 1 University of Pennsylvania Institution name Expected presentation date May 2022 Q Requestor Location ■ Tax Details

Publisher Tax ID

EU826007151

Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Dr. Jonathan Galarraga 210 South 33rd St

Figure 1.5a



Synergistic action of fibroblast growth factor-2 and transforming growth factor-beta1 enhances bioprinted human neocartilage formation
Author: Xiaofeng Cui, Kurt Breitenkamp, Martin Lotz, et al
Publication: Biotechnology & Bioengineering

Publisher: John Wiley and Sons Date: Apr 8, 2012

Copyright © 2012 Wiley Periodicals, Inc.

Order Completed

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference. License Number Printable Details Licensed Content Order Details Licensed Content Publisher John Wiley and Sons Type of use Dissertation/Thesis John Wiley and Sons
Biotechnology & Bioengineering
Synergistic action of fibroblast growth factor-2 and transforming growth
factor-betal enhances bioprinted human neocartilage formation
Xiaofeng Cul. Kurt Breitenkamp, Martin Lotz, et al
Apr 8, 2012 Requestor type Format University/Academic Print and electronic Licensed Content Publication Licensed Content Title Portion Number of figures/tables Figure/table Licensed Content Author Will you be translating? Licensed Content Volume Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair Figures 1,6 Title University of Pennsylvania Institution name Expected presentation date May 2022 Requestor Location Tax Details Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID EU826007151

Requestor Location

Figure 1.5b



Biofabrication of spatially organised tissues by directing the growth of cellular spheroids within 3D printed polymeric microchambers
Author: Andrew C. Daly,Daniel J. Kelly
Publication: Biomaterials
Publisher: Elsevier
Date: March 2019

© 2019 Elsevier Ltd. All rights reserved.

Order Completed

Requestor Location

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and Elsevier ("Elsevier") consists of your license details and the terms and conditions provided by Elsevier and Copyright Clearance Center.

Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Your confirmation email will contain your order number for future reference.

License Number 5271930989118 Printable Details License date Mar 18, 2022 Licensed Content Order Details reuse in a thesis/dissertation figures/tables/illustrations Licensed Content Publisher Biomaterials Portion
Number of figures/tables/illustrations
Format
Are you the author of this Elsevier article? Licensed Content Publication Biofabrication of spatially organised tissues by directing the growth of cellular spheroids within 3D printed polymeric microchambers Andrew C. Daly, Daniel J. Kelly Mar 1, 2019 Licensed Content Title Licensed Content Author Licensed Content Date Will you be translating? Licensed Content Volume Licensed Content Issue Licensed Content Pages About Your Work Additional Data Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania Expected presentation date May 2022 Requestor Location Tax Details Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID 98-0397604

Figure 1.5c



This is a License Agreement between University of Pennsylvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below.

All payments must be made in full to CCC in accordance with the CCC Terms and Conditions below.

	if accordance with the ecc remisand condition.		
Order Date Order License ID ISSN LICENSED CONTENT	18-Mar-2022 1201163-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
LICENSED CONTENT			
Publication Title	Biofabrication	Country	United Kingdom of Great Britain and Northern Ireland
Author/Editor	Institute of Physics (Great Britain)	Dishtahaldar	
Date	01/01/2009	Rightsholder	IOP Publishing, Ltd
Language	English	Publication Type URL	e-Journal http://iopscience.iop.org/1758-5090
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
Number of charts / graphs / tables /	1	Translation	Original language of publication
figures requested	(1)	Copies for the disabled?	No.
Format (select all that apply)	Print, Electronic	Minor editing privileges?	Yes
Who will republish the content?	Academic institution	Incidental promotional use?	No
Duration of Use	Life of current edition	Currency	USD
Lifetime Unit Quantity	Up to 499		
Rights Requested	Main product		
NEW WORK DETAILS			
Title	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
Instructor name	Jonathan H. Galarraga	Expected procession and	10
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
REUSE CONTENT DETAILS			
Title, description or numeric reference of the portion(s)	Figure 2	Title of the article/chapter the portion is from	Hybrid printing of mechanically and biologically improved constructs for
Editor of portion(s)	Jonathan H. Galarraga		cartilage tissue engineering applications
Volume of serial or monograph	N/A	Author of portion(s)	Institute of Physics (Great Britain)
Page or page range of portion	6	Issue, if republishing an article from a serial	N/A

Publication date of portion

Figure 1.6a



This is a License Agreement between University of Pennsylvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below.

All payments must be made in full to CCC in accordance with the CCC Terms and Conditions below

Order Date Order License ID ISSN

18-Mar-2022 1748-605X

Type of Use Publisher Portion

Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure

Publication Title Date Language

Biomedical Materials 01/01/2006 English

Rightsholder **Publication Type** IOP Publishing, Ltd e-lournal

Country

United Kingdom of Great Britain and

Northern Ireland

http://iopscience.iop.org/1748-605X

Portion Type

Duration of Use

Instructor name

Number of charts / graphs / tables / figures requested

Format (select all that apply) Who will republish the content?

Lifetime Unit Quantity **Rights Requested**

Chart/graph/table/figure

Print, Electronic Academic institution Life of current edition

Up to 499 Main product Distribution

Translation

Copies for the disabled? Minor editing privileges? Incidental promotional use? Currency

United States

Original language of publication

Yes No USD

NEW WORK DETAILS

Title

Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair

Dr. Jonathan H. Galarraga

Institution name

Expected presentation date

University of Pennsylvania

2022-05-16

ADDITIONAL DETAILS

Order reference number

N/A

The requesting person / organization to appear on the license

University of Pennsylvania

Title, description or numeric reference of

the portion(s)

Editor of portion(s)

Volume of serial or monograph Page or page range of portion

Figures 6,7

Jonathan H. Galarraga

10-11

Title of the article/chapter the portion is

Author of portion(s)

Issue, if republishing an article from a

Publication date of portion

Modified mannan for 3D bioprinting: a potential novel bioink for tissue engineering

Yuting Huang, Zheng Zhou, Yingbing Hu,

Ning He , Jing Li , Xiaoxiao Han , Guoqun Zhao, and Hairong Liu

Figure 1.6b



This is a License Agreement between University of Pennslvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below.

All payments must be made in full to CCC in accordance with the CCC Terms and Conditions below.

Order Date Order License ID ISSN	18-Mar-2022 1201172-1 0957-4484	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
LICENSED CONTENT			
Publication Title	Nanotechnology	Country	United Kingdom of Great Britain and Northern Ireland
Author/Editor	Institute of Physics (Great Britain)	Rightsholder	IOP Publishing, Ltd
Date Language	01/01/1990 English	Publication Type	Journal
Language	English		
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
Number of charts / graphs / tables / figures requested	2	Translation	Original language of publication
Format (select all that apply)	Print, Electronic	Copies for the disabled?	No
Who will republish the content?	Academic institution	Minor editing privileges?	Yes
Duration of Use	Life of current edition	Incidental promotional use?	No USD
Lifetime Unit Quantity	Up to 499	Currency	030
Rights Requested	Main product		
NEW WORK DETAILS			
Title	Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
Instructor name	Dr. Jonathan H. Galarraga	Expected presentation date	2022 05 10
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennslvania
REUSE CONTENT DETAILS			
Title, description or numeric reference of the portion(s)	Figures 1,3	Title of the article/chapter the portion is from	3D bioprinting mesenchymal stem cell- laden construct with core-shell
Editor of portion(s)	Jonathan H. Galarraga		nanospheres for cartilage tissue engineering
Volume of serial or monograph	N/A	Author of portion(s)	Institute of Physics (Great Britain)
Page or page range of portion	4,6	Issue, if republishing an article from a serial	N/A

Publication date of portion

Figure 1.6c



Microfluidics-Enabled Multimaterial Maskless Stereolithographic Bioprinting

Philadelphia, PA 19104 United States Attn: Dr. Jonathan Galarraga

Author: Amir K. Miri, Daniel Nieto, Luis Iglesias, et al Publication: Advanced Materials Publisher: John Wiley and Sons Date: May 7, 2018

© 2018 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

	pleted	

Requestor Location

Thank you for your order.

This Agreement between Dr. Jonathan Galarraga ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference. Printable Details License Number 5271931086350 Mar 18, 2022 License date Licensed Content Order Details John Wiley and Sons Advanced Materials Microfluidics-Enabled Multimaterial Maskless Stereolithographic Bioprinting Amir K. Miri, Daniel Nieto, Luis Iglesias, et al Type of use
Requestor type
Format
Portion
Number of figures/tables
Will you be translating? Licensed Content Publisher Licensed Content Publication Dissertation/Thesis University/Academic Print and electronic Licensed Content Title Figure/table 2 No Licensed Content Author Licensed Content Date
Licensed Content Volume
Licensed Content Issue
Licensed Content Pages May 7, 2018 30 27 Additional Data About Your Work Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania May 2022 Expected presentation date Requestor Location Tax Details EU826007151 Dr. Jonathan Galarraga 210 South 33rd St Publisher Tax ID

Figure 1.7a



Scaffold-free bioprinting of mesenchymal stem cells with the regenova printer: Optimization of printing parameters

Author: Izath Nizeet Aguilar, Lester J. Smith, David J. Olivos, Tien-Min Gabriel Chu, Melissa A. Kacena, Diane R. Wagner Publication: Bioprinting

Publisher: Elsevier Date: September 2019

© 2019 Elsevier B.V. All rights reserved.

Order Completed
Thank you for your or

This Agreement between Dr. Jonathan Galarraga ("You") and Elsevier ("Elsevier") consists of your license details and the terms and conditions provided by Elsevier and Copyright Clearance Center.

Your confirmation email will contain your order number for future reference.

Mar 18, 2022

Licensed Content Order Details

Elsevier
Bioprinting
Scaffold-Free bioprinting of mesenchymal stem cells with the regency
printer: Optimization of printing parameters
trath Nizeet Agular_Lester J. Smith.David J. Olivos, Tien-Min Gabriel
Chu_Melissa A. Kacena, Diane R. Wagner
Sep 1, 2019
15 Type of Use
Portion
Number of figures/tables/illustrations
Format
Are you the author of this Elsevier article? Licensed Content Publisher Licensed Content Publication reuse in a thesis/dissertation figures/tables/illustrations Licensed Content Title

Licensed Content Author Will you be translating?

Licensed Content Date Licensed Content Volume Licensed Content Issue Licensed Content Pages

Biofabrication Approaches with Hyaluronic Acid Hydrogels for Cartilage Repair University of Pennsylvania May 2022 Figure 1 Portions Title Institution name Expected presentation date

Requestor Location ■ Tax Details Publisher Tax ID 98-0397604

Dr. Jonathan Galarraga 210 South 33rd St Requestor Location

Figure 1.7b

IOP Publishing

Biofabrication 13 (2021) 044103

https://doi.org/10.1088/1758-5090/ac1c99

Biofabrication



OPEN ACCESS

RECEIVED 21 December 2020

REVISED 27 July 2021

ACCEPTED FOR PUBLICATION

11 August 2021

PUBLISHED

25 August 2021

Original content from this work may be used under the terms of the Creative Commons Attribution 4.0 licence.

Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.



PAPER

Bio-3D printing iPSC-derived human chondrocytes for articular cartilage regeneration

Anna Nakamura 0, Daiki Murata 0, Ryota Fujimoto, Sakura Tamaki, Sanae Nagata, Makoto Ikeya 0, Junya Toguchida, and Koichi Nakayama 0, 00

- Center for Regenerative Medicine Research, Faculty of Medicine, Saga University, Saga, Japan
- ² Center for iPS Cell Research and Application (CiRA), Kyoto University, Kyoto, Japan
- Institute for Frontier Life and Medical Sciences, Kyoto University, Kyoto, Japan
- * Author to whom any correspondence should be addressed.

E-mail: nakayama@nakayama-labs.com

Keywords: osteoarthritis, scaffold-free, tissue engineering, chondrogenesis, iPSC, Kenzan Method, articular cartilage Supplementary material for this article is available online

Abstrac

Osteoarthritis is a leading cause of pain and joint immobility, the incidence of which is increasing worldwide. Currently, total joint replacement is the only treatment for end-stage disease. Scaffold-based tissue engineering is a promising alternative approach for joint repair but is subject to limitations such as poor cytocompatibility and degradation-associated toxicity. To overcome these limitations, a completely scaffold-free Kenzan method for bio-3D printing was used to fabricate cartilage constructs feasible for repairing large chondral defects. Human induced pluripotent stem cell (iPSC)-derived neural crest cells with high potential to undergo chondrogenesis through mesenchymal stem cell differentiation were used to fabricate the cartilage. Unified, self-sufficient, and functional cartilaginous constructs up to 6 cm² in size were assembled by optimizing fabrication time during chondrogenic induction. Maturation for 3 weeks facilitated the self-organisation of the cells, which improved the construct's mechanical strength (compressive and tensile properties) and induced changes in glycosaminoglycan and type II collagen expression, resulting in improved tissue function. The compressive modulus of the construct reached the native cartilage range of 0.88 MPa in the 5th week of maturation. This paper reports the fabrication of anatomically sized and shaped cartilage constructs, achieved by combining novel iPSCs and bio-3D printers using a Kenzan needle array technology, which may facilitate chondral resurfacing of articular cartilage defects.

Figure 1.7c

Three-dimensional bioprinting using self-assembling scalable scaffold-free "tissue strands" as a new bioink

SPRINGER NATURE

Author: Yin Yu et al
Publication: Scientific Reports
Publisher: Springer Nature
Date: Jun 27, 2016

Copyright © 2016, The Author(s)

Creative Commons

This is an open access article distributed under the terms of the Creative Commons CC BY license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

You are not required to obtain permission to reuse this article.

To request permission for a type of use not listed, please contact Springer Nature

Figure 1.8a



Order Date Order License ID SSN	18-Mar-2022 1201185-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
ICENSED CONTENT			
Publication Title	Biofabrication	Country	United Kingdom of Great Britain and
Author/Editor	Institute of Physics (Great Britain)	Dishtah aldar	Northern Ireland
Date	01/01/2009	Rightsholder	IOP Publishing, Ltd
anguage	English	Publication Type URL	e-Journal http://iopscience.iop.org/1758-5090
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
lumber of charts / graphs / tables / igures requested	2	Translation Copies for the disabled?	Original language of publication No
format (select all that apply)	Print, Electronic	Minor editing privileges?	Yes
Vho will republish the content?	Academic institution	Incidental promotional use?	No
Ouration of Use	Life of current edition	Currency	USD
ifetime Unit Quantity	Up to 499		
tights Requested	Main product		
NEW WORK DETAILS			
itle	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
nstructor name	Jonathan H. Galarraga		
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
REUSE CONTENT DETAILS			
itle, description or numeric reference of he portion(s)	Figures 1,3	Title of the article/chapter the portion is from	3D bioprinting of hydrogel constructs wit cell and material gradients for the
ditor of portion(s)	Jonathan H. Galarraga		regeneration of full-thickness chondral defect using a microfluidic printing head
ditor or portion(s)			
olume of serial or monograph	N/A	Author of portion(s)	Institute of Physics (Great Britain)
	N/A 3,9	Author of portion(s) Issue, if republishing an article from a serial	Institute of Physics (Great Britain) N/A

Figure 1.8b



Order Date Order License ID ISSN LICENSED CONTENT	18-Mar-2022 1201186-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
Publication Title Author/Editor Date Language	Biofabrication Institute of Physics (Great Britain) 01/01/2009 English	Country Rightsholder Publication Type URL	United Kingdom of Great Britain and Northern Ireland IOP Publishing, Ltd e-Journal http://iopscience.iop.org/1758-5090
Portion Type Number of charts / graphs / tables / figures requested Format (select all that apply) Who will republish the content? Duration of Use Lifetime Unit Quantity Rights Requested NEW WORK DETAILS	Chart/graph/table/figure 2 Print, Electronic Academic institution Life of current edition Up to 499 Main product	Distribution Translation Copies for the disabled? Minor editing privileges? Incidental promotional use? Currency	United States Original language of publication No Yes No USD
Title Instructor name ADDITIONAL DETAILS	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair Jonathan H. Galarraga	Institution name Expected presentation date	University of Pennsylvania 2022-05-16
Order reference number REUSE CONTENT DETAILS	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
Title, description or numeric reference of the portion(s) Editor of portion(s) Volume of serial or monograph	Figures 1,2 Jonathan H. Galarraga N/A	Title of the article/chapter the portion is from	Cryogenic 3D printing of heterogeneous scaffolds with gradient mechanical strengths and spatial delivery of osteogenic peptide/TGF-β1 for osteochondral tissue regeneration
Page or page range of portion	6	Author of portion(s) Issue, if republishing an article from a serial	Institute of Physics (Great Britain) N/A
		Publication date of portion	2009-01-01

Figure 1.8c



	in accordance with the ecc remis and condition.		
Order Date Order License ID ISSN	18-Mar-2022 1201188-1 1758-5090	Type of Use Publisher Portion	Republish in a thesis/dissertation IOP Publishing Chart/graph/table/figure
LICENSED CONTENT			
Publication Title	Biofabrication	Country	United Kingdom of Great Britain and
Author/Editor	Institute of Physics (Great Britain)	Dightsholdor	Northern Ireland
Date	01/01/2009	Rightsholder Publication Type	IOP Publishing, Ltd e-Journal
Language	English	URL	http://iopscience.iop.org/1758-5090
REQUEST DETAILS			
Portion Type	Chart/graph/table/figure	Distribution	United States
Number of charts / graphs / tables /	1	Translation	Original language of publication
figures requested Format (select all that apply)	Print, Electronic	Copies for the disabled?	No
Who will republish the content?	Academic institution	Minor editing privileges?	Yes
Duration of Use	Life of current edition	Incidental promotional use?	No
Lifetime Unit Quantity	Up to 499	Currency	USD
Rights Requested	Main product		
NEW WORK DETAILS			
Title	Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair	Institution name	University of Pennsylvania 2022-05-16
Instructor name	Jonathan H. Galarraga	Expected presentation date	2022-05-16
ADDITIONAL DETAILS			
Order reference number	N/A	The requesting person / organization to appear on the license	University of Pennsylvania
REUSE CONTENT DETAILS			
Title, description or numeric reference of the portion(s)	Figure 1	Title of the article/chapter the portion is from	A composite hydrogel-3D printed thermoplast osteochondral anchor as
Editor of portion(s) Volume of serial or monograph	N/A N/A		example for a zonal approach to cartilage repair: in vivo performance in a long-term equine mode
Page or page range of portion	4	Author of portion(s)	Institute of Physics (Great Britain)
		Issue, if republishing an article from a serial	N/A
		Publication date of portion	2009-01-01

Chapter 3

ACS Publications

Fundamentals and Applications of Photo-Cross-Linking in Bioprinting

Author: Khoon S. Lim, Jonathan H. Galarraga, Xiaolin Cui, et al

Publication: Chemical Reviews Publisher: American Chemical Society

Copyright © 2020, American Chemical Society

PERMISSION/LICENSE IS GRANTED FOR YOUR ORDER AT NO CHARGE

This type of permission/license, instead of the standard Terms and Conditions, is sent to you because no fee is being charged for your order. Please note the following:

- Permission is granted for your request in both print and electronic formats, and translations.
- If figures and/or tables were requested, they may be adapted or used in part.
- Please print this page for your records and send a copy of it to your publisher/graduate school.
- Appropriate credit for the requested material should be given as follows: "Reprinted (adapted) with permission from (COMPLETE REFERENCE CITATION). Copyright (YEAR) American Chemical Society."
Insert appropriate information in place of the capitalized words.
- One-time permission is granted only for the use specified in your RightsLink request. No additional uses are granted (such as derivative works or other editions). For any uses, please submit a new request.

If credit is given to another source for the material you requested from RightsLink, permission must be obtained from that source.

CLOSE WINDOW

Chapter 4

3D bioprinting via an in situ crosslinking technique towards engineering cartilage tissue

Author: Jonathan H. Galarraga et al SPRINGER NATURE

Publication: Scientific Reports
Publisher: Springer Nature Date: Dec 27, 2019

Copyright © 2019, The Author(s)

Creative Commons

This is an open access article distributed under the terms of the Creative Commons CC BY license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

You are not required to obtain permission to reuse this article.

To request permission for a type of use not listed, please contact Springer Nature

Chapter 5



This is a License Agreement between University of Pennsylvania ("User") and Copyright Clearance Center, Inc. ("CCC") on behalf of the Rightsholder identified in the order details below. The license consists of the order details, the CCC Terms and Conditions below, and any Rightsholder Terms and Conditions which are included below.

All payments must be made in full to CCC in accordance with the CCC Terms and Conditions below.

Order Date Order License ID ISSN

1201060-1 1758-5090

Type of Use Publisher Portion

Republish in a thesis/dissertation IOP Publishing

Chapter/article

IOP Publishing, Ltd

Main product

United States

Publication Title

Language

Author/Editor Date

Institute of Physics (Great Britain) 01/01/2009 English

Biofabrication

Country

Rightsholder **Publication Type**

e-lournal

URL

http://iopscience.iop.org/1758-5090

Original language of publication

United Kingdom of Great Britain and Northern Ireland

Portion Type Page range(s) Total number of pages

Format (select all that apply) Who will republish the content? **Duration of Use** Lifetime Unit Quantity

Chapter/article 1-16

Print, Electronic Academic institution

Life of current edition Up to 499

Rights Requested Distribution Translation

Copies for the disabled?

Minor editing privileges? Incidental promotional use? No Yes USD

Instructor name

Biofabrication approaches with hyaluronic acid hydrogels for cartilage repair

Jonathan H. Galarraga

Institution name

Currency

Expected presentation date

University of Pennsylvania

2022-05-16

ADDITIONAL DETAILS

Order reference number

N/A

The requesting person / organization to

appear on the license

University of Pennsylvania

Title, description or numeric reference of

the portion(s) Editor of portion(s)

Volume of serial or monograph

Page or page range of portion

Complete Article

Jonathan H. Galarraga

1-16

Title of the article/chapter the portion is

Author of portion(s) Issue, if republishing an article from a

Publication date of portion

Fabrication of MSC-laden composites of hyaluronic acid hydrogels reinforced with MEW scaffolds for cartilage repair

Institute of Physics (Great Britain)

2022-05-16