Surface Roughness and Morphology of Au film prepared by PVD75 e-beam evaporator

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Keywords
Surface Roughness, Morphology, Au film, PVD75 e-beam evaporator

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Surface Roughness and Morphology of Au film prepared by PVD75 e-beam evaporator (Graduate Student Fellow Program)

Prepared by Zisong Nie (10/30/2014)

Tooling factor: 31-33 %

Surface Roughness
- Thickness measurement: P7 2D stylus profiler
- Atomic Force Microscopy
  - Measured area (Field of View): 1 µm x 1 µm
  - PV (Peak-to-Valley): The distance between the highest and lowest points within the sample.
  - rms: The root-mean square deviation from the center line. The center line is defined as the best fit surface selected with the Remove control.
  - Ra: The average deviation from the center line.
  - The grain sizes were estimated using AFM phase images.

<table>
<thead>
<tr>
<th>Deposition rate (A/s)/(nm/min)</th>
<th>Thickness of Au (nm)</th>
<th>Ra (nm)</th>
<th>rms (nm)</th>
<th>PV (nm)</th>
<th>Grain size (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 (0.6)</td>
<td>62.6</td>
<td>0.434</td>
<td>0.54</td>
<td>4.05</td>
<td>66.2</td>
</tr>
<tr>
<td>0.3 (1.8)</td>
<td>60.8</td>
<td>0.518</td>
<td>0.648</td>
<td>5.68</td>
<td>39.42</td>
</tr>
<tr>
<td>0.5 (3.0)</td>
<td>54.4</td>
<td>0.457</td>
<td>0.569</td>
<td>4.48</td>
<td>35.72</td>
</tr>
<tr>
<td>1.0 (6.0)</td>
<td>56.9</td>
<td>0.687</td>
<td>0.859</td>
<td>6.97</td>
<td>30.61</td>
</tr>
<tr>
<td>2.0 (12.0)</td>
<td>59.7</td>
<td>0.374</td>
<td>0.482</td>
<td>6.62</td>
<td>23.57</td>
</tr>
</tbody>
</table>
AFM height images (1 µm x 1 µm) of ~60 nm thick Au films on 5 nm thick Ti film on Si wafer