Gratings for X-Ray Differential Phase-Contrast-Imaging

LIGA intensity grating after stripping of resist (2.4 µm period, 50 µm gold height)

2D-intensity grating, gold height >30 µm, period 4 µm in x- and y-directions

2D-phase grating in Nickel

General Aspects

Material of grating
Source and Intensity Grating: Electroplated gold
Phase Shifting Grating: Electroplated Nickel

Substrate Options
Thin membranes for design energies 5 to 15 keV mounted to a ring
200 µm thin silicon wafers (4 inch) for 15 to 30 keV
525 µm standard silicon (4 inch) for energies above 30 keV

Patterned area
70 mm round maximum, 100 mm round in preparation

Duty Cycle Control
0.5 (+0.03 - 0.03) for Phase Gratings

Height variation
+/-10% over patterned area

Bending radius
Minimum radius 8 cm (small area source grating)

Examples of Set-Ups

<table>
<thead>
<tr>
<th>Design Energy</th>
<th>8 keV</th>
<th>25 keV</th>
<th>40 keV</th>
<th>100 keV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity Grating (Period/Gold-Height)</td>
<td>2.4 µm / 30 µm</td>
<td>2.4 µm / 50 µm</td>
<td>2.4 µm / 80 µm</td>
<td>4.8 µm / 220 µm</td>
</tr>
<tr>
<td>Pi-Shift Phase Grating (Period/Nickel-Height)</td>
<td>4.65 µm / 2.8 µm</td>
<td>4.39 µm / 8.8 µm</td>
<td>4.20 µm / 14.1 µm</td>
<td>6.35 µm / 35.3 µm</td>
</tr>
<tr>
<td>Talbot Order</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total Length/cm</td>
<td>175</td>
<td>186</td>
<td>194</td>
<td>181</td>
</tr>
</tbody>
</table>

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