

# PRODUCT COMPARISON

## Grat-Film™ : High-quality CVD graphene films

### CVD Graphene on Copper

Product Name	Product Features	Available Sizes (in <sup>2</sup> )
Gratom-M-Cu	<ul style="list-style-type: none"> <li>• <u>Monolayer percentage &gt; 95%</u></li> <li>• Optical transmittance at 550 nm &gt; 97% (excl. substrate)</li> <li>• Average Raman Id/Ig &lt; 5% within domain</li> <li>• Average Hall mobility of 2000-4000 cm<sup>2</sup>/Vs at n=1e12 /cm<sup>2</sup></li> <li>• Average sheet resistance of 300-600 ohm/sq. when transferred to PMMA or PET substrate</li> </ul>	2 x 2 4 x 4 8 x 10 12 x 14
Gratom-R-Cu	<ul style="list-style-type: none"> <li>• <u>Monolayer with occasional multilayer islands</u></li> <li>• Optical transmittance at 550 nm &gt; 95% (excl. substrate)</li> <li>• Average sheet resistance of 300-600 ohm/sq. when transferred to PMMA or PET substrate</li> </ul>	8 x 10 12 x 14
Gratom-A-Cu	<ul style="list-style-type: none"> <li>• Large-area, as-grown CVD graphene</li> </ul>	12 x 60 24 x 60 24 x 100 24 x 300
Gratom-S-Cu	<ul style="list-style-type: none"> <li>• Isolated single graphene domain</li> <li>• Large graphene domain (30 – 200 μm)</li> <li>• Average Raman Id/Ig &lt; 5% within domain</li> </ul>	2 x 2

- Copper thickness 1mil (25 μm)
- Contact us for other dimensions or different copper film thickness

### CVD Graphene on SiO<sub>2</sub>/Si

Product Name	Product Features	Available Sizes
Gratom-M-Si1	<ul style="list-style-type: none"> <li>• <u>Graphene film coverage &gt; 95% with occasional holes and cracks (&lt; 5 %)</u></li> <li>• Monolayer graphene percentage &gt; 95%</li> <li>• # of cracks or holes larger than 3 mm: 0</li> <li>• Average Raman Id/Ig &lt; 5% within domain</li> <li>• Average Hall mobility of 2000-4000 cm<sup>2</sup>/Vs at n=1e12 /cm<sup>2</sup></li> <li>• Average sheet resistance of 300-600 ohm/sq.</li> </ul>	1cm x 1cm 2" or 4" wafer
Gratom-M-Si2	<ul style="list-style-type: none"> <li>• <u>Graphene film coverage &gt; 99% with occasional holes and cracks (&lt; 1 %)</u></li> <li>• Monolayer graphene percentage &gt; 95%</li> <li>• # of cracks or holes larger than 3 mm: 0</li> <li>• Average Raman Id/Ig &lt; 5% within domain</li> <li>• Average Hall mobility of 2000-4000 cm<sup>2</sup>/Vs at n=1e12 /cm<sup>2</sup></li> <li>• Average sheet resistance of 300-600 ohm/sq.</li> </ul>	1cm x 1cm 2" or 4" wafer
Gratom-S-Si	<ul style="list-style-type: none"> <li>• Isolated single graphene domain</li> <li>• Large graphene domain (30 – 200 μm)</li> <li>• Average Raman Id/Ig &lt; 5% within domain</li> </ul>	2" wafer

- Wafer spec: thermal grown 285-nm SiO<sub>2</sub> on p-type Si substrate (resistivity <0 .005 ohm-cm)
- Contact us directly for other specs not listed

### CVD Graphene transferred on PET

Product Name	Product Features	Available Sizes (in <sup>2</sup> )
Gratom-O1	<ul style="list-style-type: none"> <li>• Transmission of graphene at 550 nm: &gt; 95% (excl. substrate)</li> <li>• Average sheet resistance: &lt; <u>800 ohm/sq.</u></li> </ul>	2 x 2 4 x 4 8 x 10
Gratom-O2	<ul style="list-style-type: none"> <li>• Transmission of graphene at 550 nm: &gt; 95% (excl. substrate)</li> <li>• Average sheet resistance: &lt; <u>300 ohm/sq.</u></li> </ul>	2 x 2 4 x 4 8 x 10
Gratom-O3	<ul style="list-style-type: none"> <li>• Transmission of graphene at 550 nm: &gt; 93% (excl. substrate)</li> <li>• Average sheet resistance: &lt; <u>150 ohm/sq.</u></li> </ul>	2 x 2 4 x 4 8 x 10
Gratom-O4	<ul style="list-style-type: none"> <li>• Transmission of graphene at 550 nm: &gt; 90% (excl. substrate)</li> <li>• Average sheet resistance: &lt; <u>70 ohm/sq.</u></li> </ul>	2 x 2 4 x 4 8 x 10
Gratom-O5	<ul style="list-style-type: none"> <li>• Transmission of graphene at 550 nm: &gt; 85% (excl. substrate)</li> <li>• Average sheet resistance: &lt; <u>30 ohm/sq.</u></li> </ul>	2 x 2 4 x 4 8 x 10

- PET thickness 5 mil (125 micron), transmittance 87% @ 550 nm
- Contact us for other dimensions or customized products