

## PRODUCT DATASHEET

Last revised: 03.2018

High Strength Metallurgical Graphene (HSMG®) is a graphene layer grown by controlled carbon precipitation from liquid metal matrix. The growth process is fully controlled and enables production of large-scaled and quasi-monocrystalline graphene sheets.

<b>GROWTH METHOD</b>	Metallurgical graphene growth on liquid metal
<b>STANDARD SUBSTRATES</b>	PMMA, Si/SiO <sub>2</sub> , quartz
<b>TRANSFER AVAILABILITY</b>	Transfer on custom substrates available upon request
<b>QUALITY CONTROL</b>	Raman spectroscopy, Optical microscopy, SEM microscopy
<b>FORM</b>	Graphene film
<b>GRAIN SIZE</b>	Up to 1mm
<b>COVERAGE*</b>	>95%
<b>OPTICAL TRANSMITTANCE*</b>	>97% (measured on quartz with UV-Vis method)
<b>THICKNESS (THEORETICAL)</b>	0,345 nm
<b>AVERAGE SHEET RESISTANCE*</b>	<250 Ω/cm <sup>2</sup> (measured on Si/SiO <sub>2</sub> with van der Pauw method)

\*values confirmed by EIT+ Wrocław Research Centre independent product evaluation study

## PATENTS

AGP has patented the method of producing and processing graphene from liquid metal matrix in Poland (PL 224409 B1 and PL 224447 B1), the United States (US 9,284,640 B2) and the European Union (EP 2865646 A1).

## CERTIFICATES

HSMG® and AGP's laboratories have been awarded Nano SoP certification by Tuv-Sud. Graphene evaluation was conducted independently by EIT+ Wrocław Research Centre.



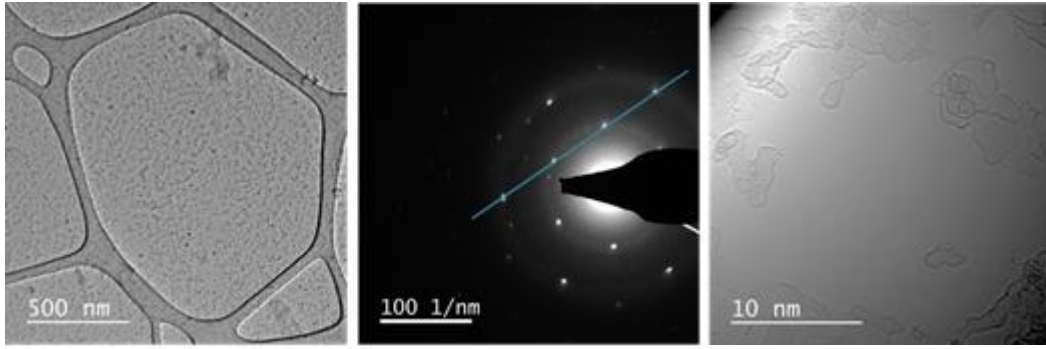
Polska



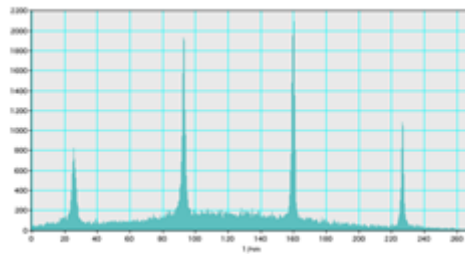
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## TEM\*

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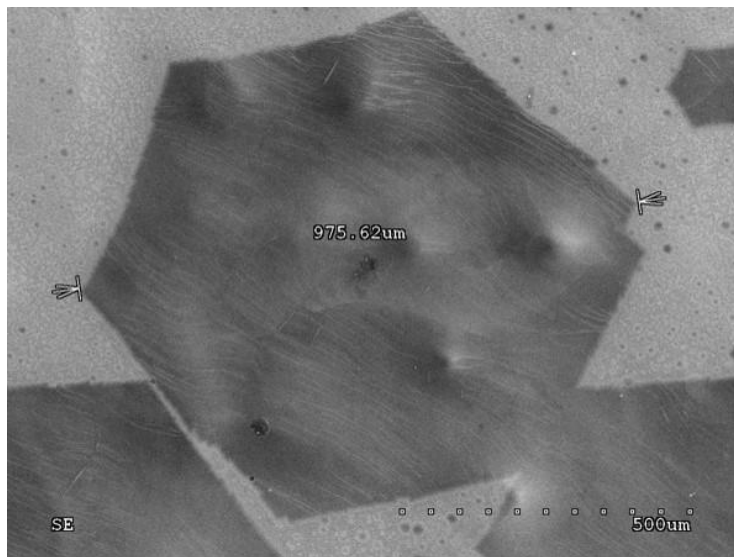
HSMG® suspended on TEM grids



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## SEM

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Evaluation of graphene grain size during growth process

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## Raman spectroscopy

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