



CHARACTERISATION NOTE

PRODUCT: **REDUCED GRAPHENE OXIDE, powder**

SECTION 1: Identification of the substance/mixture and of the undertaking

Product name:	Reduced graphene oxide
Synonyms:	rGO, reduced graphene oxide flakes, rGO flakes, rGO powder
Manufacturer:	Institute of Electronic Materials Technology 133 Wólczyńska str., 01-919 Warsaw, POLAND phone: +48 22 639 58 52
Chemical name:	Reduced graphene oxide
Application:	Laboratory chemicals, manufacturing of substances, barrier coatings, membranes, biomedical applications, fillers

SECTION 2: Basic properties

Appearance:	From gray to black
Odour:	Flavourless
Bulk density:	0.019 g/cm ³
Specific surface area:	266 m ² /g
Solubility in water:	Hydrophobic
Stability:	Stable in air
Storage:	In an airtight container to protect against UV radiation, in a dry and cool place

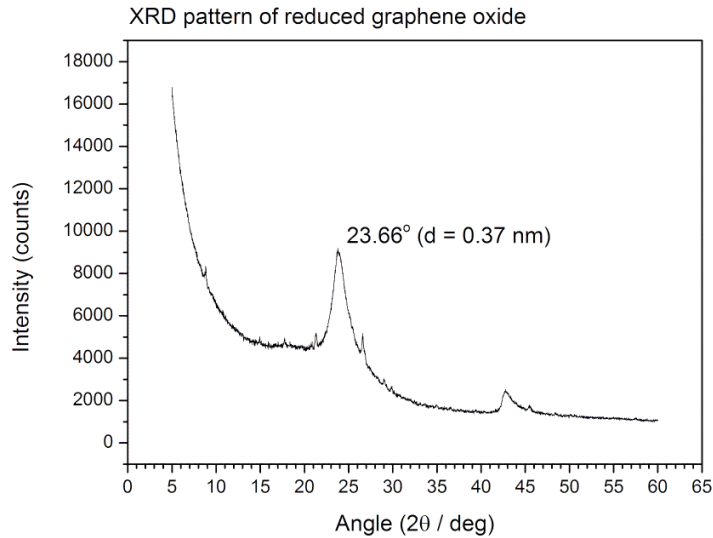
SECTION 3: Composition/information on ingredients

Carbon	70-80%
Oxygen	15-20%
Sulfur	2%
Nitrogen	<0.3%
Hydrogen	<2%

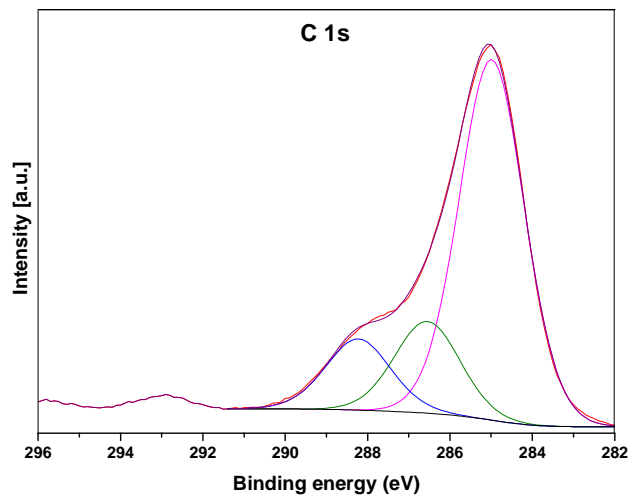
SECTION 4: Physical properties

XRD

X-ray diffraction pattern with reflections from the Bragg-grating planes (002) and (101). The average distance between layers is: ~ 0.37 nm. Number of layers in the package: ~ 11



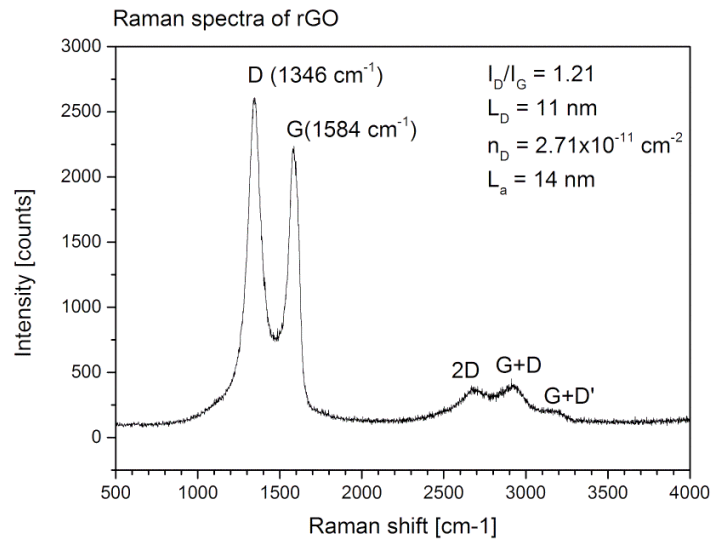
XPS



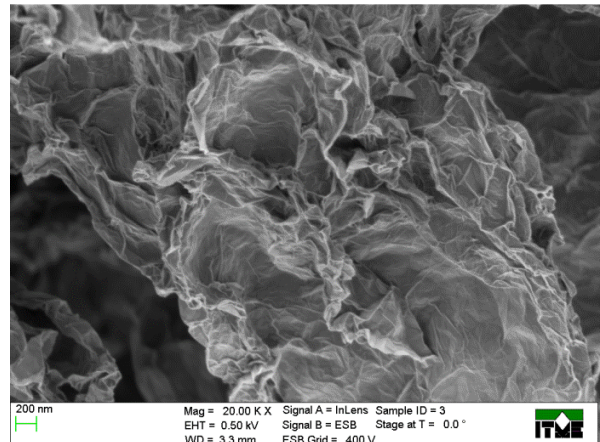
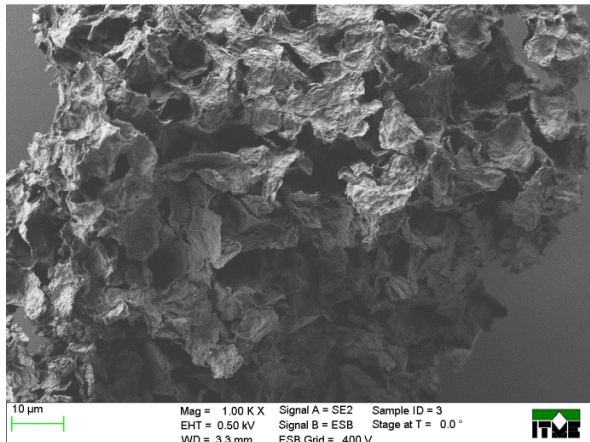
rGO	Peak BE (eV)	Concentration in atomic scale (%)	Chemical bond
C1s	285.0	39.78	C – C and C=C
C1s	286.6	10.09	C-O (hydroxyl, epoxy groups), C-N
C1s	288.2	7.84	C = O (carbonyl group)
O1s	532.3	28.7	C – O

Raman spectroscopy

Raman spectrum of modes characteristic for graphene derivatives. The average distance between defects is ~ 11 nm for concentration $2.71 \times 10^{11} \text{ cm}^{-2}$.



SEM



Transport parameters

In room temperature:

Carrier concentration $\sim 6 \times 10^{18} \text{ cm}^{-2}$

Conductivity 24 S cm^{-1}

Surface resistance $< 10 \Omega/\square$