

# ic-cmtp3

3<sup>RD</sup> INTERNATIONAL CONFERENCE ON  
COMPETITIVE MATERIALS AND TECHNOLOGY PROCESSES  
in Miskolc-Lillafüred, October 6-10, 2014 Hungary,

## Welcome to ic-cmtp3

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ISBN: 978-963-08-4874-9
- 2<sup>nd</sup> International Conference on Competitive Materials and Technology Processes  
[www.ic-cmtp2.eu](http://www.ic-cmtp2.eu)

We are pleased to announce the organization of

### ic-cmtp3

### THE 3<sup>rd</sup> INTERNATIONAL CONFERENCE ON COMPETITIVE MATERIALS AND TECHNOLOGY PROCESSES

to be held at **Hunguest Hotel Palota Lillafüred** in **Miskolc, Hungary, October 6-10, 2014.**

The 2<sup>nd</sup> International Conference on Competitive Materials and Technology Processes was also held in this wonderful palace hotel in the exceptionally beautiful **Bükk Mountains** and together with coauthors have participated on it more than **550 scientists** from **36** countries of Asia, Europe, America and Africa.

**The peer reviewed and accepted papers of ic-cmtp3 conference will be published in periodicals of IOP Conference Series: Materials Science and Engineering (MSE) which are referred by Scopus, EI Compendex, Inspec, INIS, Chemical Abstracts, NASA Astrophysics Data System and many others.** As organizers we hope you will submit your abstract and will attend on **ic-cmtp3** conference and we are looking forward to welcome you in **Miskolc, Hungary** in **October 6-10, 2014.**

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**Acknowledgement for Support**

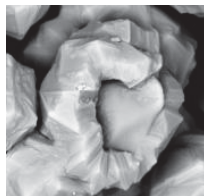
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3<sup>rd</sup> International Conference on  
Competitive Materials and Technology Processes

Miskolc-Lillafüred, Hungary  
October 6-10, 2014

# CONFERENCE PROGRAM



**ic-cmtp3**

**BEATRIX HALL**

**ORAL PRESENTATIONS**

**SESSION 11: Nanomaterials for Environment and Health**

**Chair: Prof. Dr. Tsugio Sato,  
Tohoku University(Japan)**

<b>9:40 - 10:00</b>	<b>Morphological Controlled Synthesis and Oxygen Storage Capacity of SnO<sub>2</sub></b> Mizuki Yoshida, Qiang Dong, Shu Yin, Tsugio Sato
<b>10:00 - 10:20</b>	<b>Synthesis and Their Gas Sensing Properties of Different Morphologies of SnO<sub>2</sub></b> Makoto Hamanaka, Shu Yin, Qiang Dong, Tsugio Sato
<b>10:20 - 10:40</b>	<b>Environmentally friendly composites for construction in the Arctic region</b> Valery S. Lesovik
<b>10:40 - 11:00</b>	<b>Effect of temperature and concentration of precursors on morphology and photocatalytic activity of zinc oxide thin films prepared by hydrothermal route</b> Saara Heinonen, Juha-Pekka Nikkanen, Matti Kannisto, Elina Huttunen-Saarivirta, Hanna Hakola, Erkki Levänen
<b>11:00 - 11:20</b>	<b>Polyvinyl alcohol-melamine formaldehyde resin composite and nanocomposites as antimicrobial films</b> Kalpana Madgula, Rita Kakkar, Y.V.Saritha Nehru, Pramod Kumar

**Coffee Break**

**BEATRIX HALL**

**ORAL PRESENTATIONS**

**is-icbm1 - The 1st International Symposium on Innovative Carbon Based Materials**

**SESSION 12: Novel Synthesis and Processing Technology**

**Chair: Prof. Dr. Sergey Kulkov,  
Tomsk State University(Russia)**

<b>11:30 - 11:50</b>	<b>Exfoliation of Graphite into Graphenes for Application to Transparent Electrode and Supercapacitor</b> Won Ho Jo, Kyung Tae Kim, Min Soo Kang, Heung-su Park
<b>11:50 - 12:10</b>	<b>Fabrication and Properties of Fe Modified C/C-SiC Composites</b> Yuhai Lu, Peng Xiao, Zhuan Li
<b>12:10 - 12:30</b>	<b>Centimeter-long SiC nanowires: synthesis, characterization and growth mechanism</b> Xiaodong Zhang, Joachim Bollmann, Xiaoxiao Huang, Guangwu Wen
<b>12:30 - 12:50</b>	<b>Redox synthesis of metal/carbon nanocomposites</b> Vladimir Kodolov, Vera Trineeva

**12:30-14:00**

**LUNCH**

# Exfoliation of Graphite into Graphenes for Application to Transparent Electrode and Supercapacitor

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A high-yielding dispersion of graphene at high concentration in solvent is critical for practical applications. Herein, we demonstrate the formation of stable dispersion of pristine graphene in ethanol by exfoliating graphite flakes into individual graphene layers using a non-ionic polymer surfactant under bath-type sonication. Oligothiophene-terminated poly(ethylene glycol) was synthesized and used as a non-ionic and amphiphilic surfactant for exfoliating graphite into graphenes [1-3]. High-quality graphene film was fabricated from the exfoliated graphene solution by the vacuum filtration method. TEM and SEM reveal that the size of exfoliated graphene flake is larger than 1  $\mu\text{m}$ . When the graphene film was treated with nitric acid and thionyl chloride after washing with tetrahydrofuran, the film showed high performance with a sheet resistance of  $0.3 \text{ k}\Omega \text{ sq}^{-1}$  with a transparency of 74% at 550 nm.

On the other hand, a water-soluble conducting polymer, PSSA-g-PANI, was also synthesized and used to directly exfoliate graphite into graphene layers in aqueous media, because PANI in PSSA-g-PANI is strongly physisorbed onto graphene surface via strong  $\pi$ - $\pi$  interaction while PSSA in PSSA-g-PANI enhances water solubility [4]. Hence, PSSA-g-PANI exfoliates directly graphite into graphene layers and well disperses the layers in aqueous media, and thus PSSA-g-PANI/graphene composite films for supercapacitor electrode are easily fabricated by a solution process. The capacitances of the composites depend upon the length and composition of PANI in PSSA-g-PANI. When the capacitances of the composites with different PSSA-g-PANIs were measured by cyclic voltammetry, the composite with the ratio of ANI/SSA (50/50) in PSSA-g-PANI exhibits a very high specific capacitance of 350 F/g at a scan rate of 50 mV/s, which is among the highest values of EDLC type supercapacitor, and the composite also shows superior cycle life with 90% retention of the initial specific capacitance after 1000 cycles as compared to pseudo supercapacitor [5].

**Keywords:** *graphite, graphene, exfoliation, transparent electrode, supercapacitor, amphiphilic surfactant*

[1] J. U. Lee, J. Huh, K. H. Kim, C. Park and W. H. Jo, *Carbon*, **2007**, 45, 1051.

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[3] M. S. Kang, K. T. Kim, J. U. Lee and W. H. Jo, *J. Mater. Chem. C*, **2013**, 1, 1870.

[4] W. J. Bae, K. H. Kim, Y. H. Park and W. H. Jo, *Chem. Commun.*, **2003**, 2768.

[5] J. W. Jo, K. T. Kim, H. Park and W. H. Jo, in preparation.

Please choose and underline: **Invited** (30 minutes), **Oral** (20 minutes) **Short Oral** (5 minutes + poster) or **Poster** presentation do you like.