

# NICOM3

## 3<sup>rd</sup> International Symposium on Nanotechnology in Construction Prague, Czech Republic, May 31- June 2, 2009

Hosted by: Faculty of Civil Engineering, Czech Technical University in Prague

### Preliminary Program (issued on March 27, 2009)

#### Day 1: Sunday 31<sup>st</sup> May 2009


##### Pre-registration and welcome reception

- 15:00-19:30 **Registration** desk opened
- 17:45-18:00 **Z. Bittnar:**  
Opening and Invitation Talk
- 18:00-19:00 **Welcome reception**

#### Day 2: Monday 1<sup>st</sup> June 2009 a.m.

- 7:30-9:00, 10:00-18:00 **Registration** desk opened

##### Plenary Session 1

- 8:30-8:45 Opening Talk (CTU representative)
- 8:45-9:10 **Invited lecture: P.J.M. Bartos:**  
Nanotechnology in Construction: A Roadmap for Development
- 9:10-9:45 **Invited lecture: J. Lee, S. Mahendra and P.J.J. Alvarez:**  
Potential Environmental and Human Health Impacts of Nanomaterials Used in the Construction Industry
- 9:45-10:20 **Invited lecture: H. Jennings:**  
The Colloid/Nanogranular Nature of Cement Paste and Properties
- 10:20-10:40  **Coffee break**

##### Session A1- Nanostructure Characterization

- 10:40-11:05 **Keynote: J.O. Ojo and B.J. Mohr:**  
A Review of the Analysis of Cement Hydration Kinetics via <sup>1</sup>H Nuclear Magnetic Resonance
- 11:05-11:30 **Keynote: J.S. Schweitzer et al.:**  
Progress in Nanoscale Studies of Hydrogen Reactions in Construction Materials
- 11:30-11:45 **W. Zhu, M.T.J. Fonteyn, J. Hughes and C. Pearce :**  
Nanoindentation Study of Resin Impregnated Sandstone and Early-Age Cement Paste Specimens
- 11:45-12:00 **P. Mondal, S.P. Shah and L.D. Marks:**  
Nanomechanical Properties of Interfacial Transition Zone in Concrete
- 12:00-12:15 **S.F. Lee, J.Y. He, X.H. Wang, Z.L. Zhang and S. Jacobsen:**  
Study of P-h Curves on Nanomechanical Properties of Steel Fiber Reinforced Mortar

- 12:30-14:00  **Lunch**

##### Session B1- Nanoadditives

- 10:40-11:05 **Keynote: K. Sobolev et al.:**  
Engineering of SiO<sub>2</sub> Nanoparticles for Optimal Performance in Nano Cement-Based Materials
- 11:05-11:20 **M.R. Kessler and W.K. Goertzen:**  
Polymer Nanocomposites for Infrastructure Rehabilitation
- 11:20-11:35 **A.R. Jayapalan, B.Y. Lee and K.E. Kurtis:**  
Effect of Nano-Sized Titanium Dioxide on Early Age Hydration of Portland Cement
- 11:35-11:50 **M. M. Alavi Nikje, A. Bagheri Garmarudi, M. Haghshenas and Z. Mazaheri:**  
Improving the Performance of Heat Insulation Polyurethane Foams by Silica Nanoparticles
- 11:50-12:05 **M.M. Alavi Nikje, M. Khanmohammadi and A. Bagheri Garmarudi:**  
Interpretation of Mechanical and Thermal Properties of Heavy Duty Epoxy Based Floor Coating Doped by Nanosilica
- 12:05-12:20 **M.R. Taha:**  
Geotechnical Properties of Soil-Ball Milled Soil Mixtures

**Session A2- Innovations, Energy Savings and Sustainable Development**

- 14:00-14:25 **Keynote: L. Raki**, J.J. Beaudoin and R. Alizadeh:  
Nanotechnology Applications for Sustainable Cement-Based Products
- 14:25-14:50 **Keynote: E.J. Garboczi**:  
Concrete nanoscience and nanotechnology: Definitions and applications
- 14:50-15:05 M.M. Andersen and **M.R. Geiker**:  
Nanotechnologies for Climate Friendly Construction – Key Issues and Challenges
- 15:05-15:20 **F.H. Halicioglu**:  
The Potential Benefits of Nanotechnology for Innovative Solutions in the Construction Sector
- 15:20-15:35 **Keles Y.** et al.:  
Economic impacts of Nanotechnology in Construction Sector
- 15:35-15:50 **M.M. Andersen** and M. Molin:  
Eco-innovation Strategies in the Construction Sector: Impacts on Nanotech Innovation in the Window Chain
- 15:50-16:05 **T. Kitisriworaphan** and Y. Sawangdee:  
Nanotechnology Divides: Development Indicators and Thai Construction Industry



16:00-16:30 **Coffee break**

**Session A3- Self-cleaning, TiO<sub>2</sub> and Health Hazards of Nanoparticles**

- 16:30-16:55 **Keynote: G. Bolte**:  
Innovative Building Material – Reduction of Air Pollution through TioCem®
- 16:55-17:10 **G. Hüsken**, M. Hunger, M. M. Ballari and H.J.H Brouwers:  
The Effect of Various Process Conditions on the Photocatalytic Degradation of NO
- 17:10-17:25 **Q.L. Yu**, H. J.H. Brouwers and M.M. Ballari:  
Experimental Study and Modeling of the Photocatalytic Oxidation of NO in Indoor Conditions
- 17:25-17:40 **W. Wang** et al.:  
Spray Deposition of Au/TiO<sub>2</sub> Composite Thin Films Using Preformed Nanoparticles
- 17:40-17:55 **W. Musikaphan** and T. Kitisriworaphan:  
Possible Impacts of Nanoparticles on Children of Thai Construction Industry

20:00-23:00 Symposium dinner

**Session B2- Nanofilaments, Fibers and CNT**

- 14:00-14:25 **Keynote: O. Jirsák** and T.A. Dao:  
Production, Properties and End-uses of Nanofibres
- 14:25-14:40 **T. Kowald** and R. Trettin:  
Improvement of Cementitious Binders by Multi-Walled Carbon Nanotubes
- 14:40-14:55 **A. Cwirzen** et al.:  
CHH Cement Composite
- 14:55-15:10 **J. Vera-Agullo** et al.:  
Mortar and Concrete Reinforced with Nanomaterials
- 15:10-15:25 **N. Silvestre** and D. Camotim:  
Stability of Compressed Carbon Nanotubes Using Shell Models
- 15:25-15:40 **N. Silvestre** and D. Camotim:  
Bending Instabilities of Carbon Nanotubes
- 15:40-15:55 **S. Inoue** and Y. Matsumura:  
Molecular Dynamics Approach for the Effect of Metal Coating on Single-Walled Carbon Nanotube

**Session B3- CNT, Coatings, Foams and Aerogels**

- 16:30-16:55 **Keynote: S.P. Shah**, M.S. Konsta-Gdoutos, Z.S. Metaxa and P. Mondal:  
Nanoscale Modification of Cementitious Materials
- 16:55-17:10 **F. Sanchez**, L. Zhang and C. Ince:  
Multi-Scale Performance and Durability of Carbon Nanofiber/Cement Composites
- 17:10-17:25 **N. Yazdani** and T. Manzur:  
Effect of Carbon Nanotubes on the Properties of Cement Mortar
- 17:25-17:40 **F. Scalisi**:  
Nano-Structured Materials in New and Existing Buildings: To Improved Performance and Saving of Energy
- 17:40-17:55 **M. Kutschera**, T. Breiner, H. Wiese, M. Leitl and M. Bräu:  
Nano-Modification of Building Materials for Sustainable Construction
- 17:55-18:10 **J.F. Muñoz**, J.M. Sanfilippo, M.I. Tejedor, M.A. Anderson and S.M. Cramer:  
Mitigation of Leachates in Blast Furnace Slag Aggregates by Application of Nanoporous Thin Films

## Day 3: Tuesday 2<sup>nd</sup> June 2009 a.m.

8:00-12:00 Registration desk opened

### Plenary Session 2

9:10-9:45 **Invited lecture: F.-J. Ulm** and M. Vandamme:  
Probing Nano-Structure of C-S-H by Micro-Mechanics Based Indentation Techniques

9:45-10:20 **Invited lecture: K.L. Scrivener:**  
Nanotechnology and Cementitious Materials

10:20-10:50  **Coffee break**

### Session A4- Multiscale Modeling

10:50-11:15 **Keynote: S. Scheiner** and **C. Hellmich:**  
Continuum Microviscoelasticity Model for Cementitious Materials: Upscaling Technique and First Experimental Validation


11:15-11:40 **Keynote: G. Constantinides**, J.F Smith and F.-J. Ulm:  
Nanomechanical Explorations of Cementitious Materials: Recent Results and Future Perspectives

11:40-11:55 **J.J. Gaitero**, W. Zhu and I. Campillo:  
Multi-Scale Study of Calcium Leaching in Cement Pastes with Silica Nanoparticles

11:55-12:10 **D. Davydov** and M. Jirásek:  
Modeling of Nanoindentation by a Visco-Elastic Porous Model with Application to Cement Paste

12:10-12:25 **E. Cerro-Prada** et al.:  
Nanoscale Agent Based Modelling for Nanostructure Development of Cement

12:15-13:30  **Lunch**

13:30-13:45  **Group Photo** of all participants at the front entrance to the Faculty of Civil Engineering

### Poster Session 13:45-14:30

**M.M. Ballari** et al.:

**T. Ebadzadeh** and L. Sharifi:

**V. Matějka** et al.:

**R. Sadeghi Doodaran** and M. Pasbani Khiavi:

**L.P. Singh**, S.K. Agarwal and Saurabh Ahlawat:

**J. Zelić**, D. Jozić, D. Krpan-Lisica:

Heterogeneous Photocatalysis Applied to Concrete Pavement for Air Remediation

Synthesis of  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> Nanopowder by Microwave Heating of Boehmite Gel

Utilization of Photoactive Kaolinite/TiO<sub>2</sub> Composite in Cement-Based Building Materials

Effects of Sabalan Tuff as a Natural Pozzolan on Properties of Plastic Concrete

Synthesis & Applications of Nano-Silica for the Understanding of Calcium-Silicate-Hydrate System

Synergistic Action of a Ternary System of Portland Cement – Limestone – Silica Fume in Concrete

### Session B4- Cement Hydration and UHPC

10:50-11:15 **Keynote: R.A. Livingston**, W. Bumrongjaroen and A.J. Allen:  
The Fractal Ratio as a Metric of Nanostructure Development in Hydrating Cement Paste

11:15-11:30 **V. Spaeth**, J.P.Lecomte, T. Buttner and M.P.Delplancke-Ogletree:  
Waterrepellent cement materials: Hydration process and Nanostructure development

11:30-11:45 **D. Lowke** :  
Interparticle Forces and Rheology of Cement Based Suspensions

11:45-12:00 **C. Lehmann**, P. Fontana and U. Müller:  
Evolution of Phases and Micro Structure in Hydrothermally Cured Ultra-High Performance Concrete (UHPC)

12:00-12:15 **T. Stengel**:  
Effect of Surface Roughness on the Steel Fibre Bonding in Ultra High Performance Concrete (UHPC)

**Session A5- Metrology, Sensor Technologies and Probabilistic modeling**

- 14:30-14:55 **Keynote: J.E. Decker** et al.:  
Developments in Metrology in Support of Nanotechnology
- 14:55-15:10 **J.P. Lynch**, K.J. Loh, T.-C. Hou and N. Kotov:  
Nanocomposite Sensing Skins for Distributed Structural Sensing
- 15:10-15:25 **L. Sorelli** et al. :  
FOSM Statistical Nanoindentation Techniques applied to Cementitious Composites
- 15:25-15:40 Arun Krishnan and **L. Roy Xu**:  
Uncertain Mechanical Properties and Reliability of Nanocomposite Materials

**15:40 Closing of the Symposium**

**Session B5- Alternative Aluminosilicate Binders**

- 14:30-14:55 **Keynote: J.L. Provis** et al.:  
Analysing and manipulating the nanostructure of geopolymers
- 14:55-15:10 C. Ruiz-SantaQuiteria, A. Fernández-Jiménez, **A. Palomo**:  
Alkali activation of aluminosilicates
- 15:10-15:25 **J. Němeček**, V. Šmilauer and L. Kopecký:  
Characterization of Alkali-activated Fly-ash by Nanoindentation
- 15:25-15:40 **I. Beleña** and W. Zhu:  
Nanoindentation Study of Na-Geopolymers Exposed to High Temperatures