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## Editorial

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**Biographical notes:** Janez Grum is a Professor of Materials Science at the Faculty of Mechanical Engineering, University of Ljubljana, Slovenia. He is also the Founder and Editor-in-Chief of a new journal, the *International Journal of Microstructure and Materials Properties (IJMMP)*. He is the Editor of six NDT conference proceedings, five ASM, Marcel Dekker and Taylor & Francis book chapters and five books with several reprints. He has also published more than 200 refereed journal papers on heat treatment and surface engineering, laser materials processing and materials testing, including non-destructive testing.

Sami El-Borgi is a Professor of Civil Engineering and Applied Mechanics at the Carthage University and is currently a Visiting Professor at Texas A&M University at Qatar. His research interests include mechanics of functionally graded materials and structural health monitoring. He has collaborated with several international scientists as a Principal Investigator in more than 15 international research projects. He has published more than 50 refereed journal papers. In collaboration with Virginia Tech, he established the Computational Mechanics Master's Programmes and the Applied Mechanics Doctoral Programme at Carthage University. He served as ICAMEM Conference General Chair in 2008 and 2010.

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The present special issue of the *International Journal of Microstructure and Materials Properties* comprises seven papers discussing investigations conducted on various fields of materials and materials properties.

Papers were selected among those presented at the fifth International Conference on Advances in Mechanical Engineering and Mechanics (ICAMEM 2010) held on

December 18–20, 2010 in Hammamet, Tunisia. All papers were extended and reviewed by distinguished reviewers according to journal procedures and standards.

The following authors contributed their papers with the topics.

Katicha et al. discussed non-linear hot-mix asphalt behaviour from uniaxial creep and dynamic modulus test. They observed that non-linear behaviour occurred at high temperatures/reduced time. The specimen deformation response in the dynamic modulus test was used to confirm that the observed differences between the creep compliance and dynamic modulus test results were due to non-linearity and not just experimental error.

Kaci et al. reported about the influence of loading rates on morphology and mechanical properties of clay nanocomposites based on polylactide (PLA). The nanocomposites were prepared by melt intercalation in a mixer. Wide angle X-ray scattering showed that the clay was finely distributed in the PLA matrix. The effect of clay loadings on the mechanical properties was investigated by nanoindentation and tensile measurements. Nanoindentation results showed a significant improvement in modulus and hardness with increase of the clay contents.

Dammak et al. presented effects of test conditions on the friction and wear of polyethylene. Authors aimed to analyse the effects of sliding speed and the applied load on the wear and friction behaviour of HDPE sliding against high chromium steel ball. It was found out that the effect of the sliding speed on the friction behaviour is stronger than that of the normal load.

Helal et al. studied processing and characterisation of polymer-based nanocomposites of a flexible lightweight polymer matrix (polyvinylidene fluoride – PVDF), the high conductivity of single wall carbon nanotubes (SWNTs) and the attractive dielectric properties of titanium dioxide ( $TiO_2$ ) nanospheres, to simultaneously achieve improved dielectric constant and low dielectric loss. They showed that improvement of the permittivity is achieved in all nanocomposites at low frequencies and attributed to interfacial and orientation polarisations and to the heat treatment.

Koubaa et al. discussed simple modelling of impregnation in pultrusion process of thermoplastic composites. They developed a model that described the flow advancement for a thermoplastic matrix when the reinforcements pass through the die and assessed influence of several processing conditions on the impregnation state. Analytical model based upon the Darcy's law and Stokes equation was applied to describe the progression of the radial flow front through porous medium. Results showed that the geometry of the die, pulling velocity and obviously the fibres permeability were the major factors influencing the degree of wetting.

El Zefzafy et al. worked on effect of short and long term freeze-thaw cycling on the mechanical behaviour of filament wound fibre-reinforced polymers tubes. The fibre orientations were mainly in the hoop direction. Test parameters in this investigation include the effect of the number and type of freeze-thaw cycles. The test results indicated that the axial tensile and compressive strength of the FRP tubes were increased after short and long term freeze-thaw cycles.

Yousfi et al. dealt with evaluation of dilute inclusion model by finite element method: applied to the cement paste. In the first part they presented the methodology adopted to model the cement paste by FEM presented. In the second part, the main equations of motion were described and both the FEM and the dilute inclusion homogenisation methods were applied to the case of dry cement paste. In the last part, results were obtained by FEM and compared. The results showed that there is a good adequacy between FEM and the model.

We sincerely thank all authors for their valuable contributions and having observed all reviewers comments and suggestions. My thanks also go to all reviewers for their effort in reviewing papers.

We greatly appreciate expert work of Prof. Dr. Sami El-Borgi, General Chairman of ICAMEM2010, Professor of Civil Engineering and Applied Mechanics on University of Carthage, Ecole Polytechnique de Tunisie (Tunisia Polytechnic School) and Visiting Professor, Mechanical Engineering Programme, Texas A&M University at Qatar, Doha, Qatar. I am grateful for his advice and assistance in selecting the papers from the aforementioned congress.

We sincerely hope that the papers published will be a useful source of information for engineers and researchers at their professional work.