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.

The present issue of the *International Journal of Microstructure and Materials Properties* comprises six spontaneous papers discussing mechanical and microstructure properties of various casting metallic and non-metallic ceramic composites.

The following papers have been included in this issue.

Canales et al. studied mechanical properties in as-cast and heat treated Al-Si-Cu alloys. The specimens were cut from ingots with different chemical compositions and microstructure occurred at strong thermal gradient. Specimens with different microstructure were machined for tensile test in the as-cast and heat treatment conditions. The analyses showed that the mechanical properties are affected by the silicon amount. They also found that heat treating enhances the yield and tensile strength, but reduces the ductility of the various aluminium alloys.

Hemanth presented behaviour of shallow cryogenically solidified aluminium-alloy reinforced with nano-ZrO_2 metal matrix composites. The author investigated fracture behaviour of aluminium alloy reinforced with different wt.% and sizes of nano-ZrO_2 particles, solidified under various shallow cryogenically cooled chills, cast using DMD technique (disintegrated melt deposition) followed by hot extrusion. Microstructural studies of the nano-composite developed indicate uniform distribution of the reinforcement in the matrix and significantly improved strength and hardness. Fractography of the specimens showed that the fracture behaviour of matrix alloy has changed from ductile intergranular mode to cleavage mode of fracture.

Ilangovan and Sellamuthu presented the effect of Ni content on hardness and wear behaviour of sand cast Cu-Ni-Sn alloys. Specimens were homogenised and aged to induce spinodal decomposition and were used for hardness and wear testing under dry sliding condition in air. Higher wt % of Ni increases the peak hardness and decreases the aging time, implying that it contributes significantly to the process of spinodal decomposition. The wear rate is found to be a function of hardness at constant coefficient of friction.

Albdiry and Alethari discussed effect of alumina inclusions on microstructure and mechanical properties of cemented carbide inserts. Specimens were prepared of an initial

mixture of 62 WC, 32(Ti-W) C and 6 Co wt% particles with; different additions of Al_2O_3. The specimens were compacted at 200 MPa and sintered at 1,410°C under vacuum. Vickers hardness and transverse rupture strength deteriorated with the increase of alumina content. This is due to interfacial grain-boundary decohesion between Al_2O_3 and carbide particles.

Kandasamy et al. was done comparative analysis of friction stir welded AA7075 aluminium alloy with and without copper as external alloying element in different forms. They determined the influence of the formed inter metallic compound (IMC) in enhancing the weld strength, by providing uniform frictional heat input to the top and bottom sides of the plates. Test results of mechanical and metallurgical properties indicate that the interaction between aluminium alloy with copper, in coating form, enhances the bond strength by formation of Al_2Cu and Al_4Cu_9 IMCs. High thermal conductivity of the copper in coating form has reduced the temperature gradient and maintained homogenous material flow in the weld zone. Reduction in weld strength is observed in copper strip inserted weldments due to interruption of the unmelted copper particles in aluminium matrix in the weld zone leading to a weak bond.

Arimoto et al. studied on distortions in nitrided steel cylinders using computer simulation. A software tool based on the finite element method was developed using of the latest models applied to the nitrided austenitic stainless steels. In this study, distortions in nitrided steel cylinders, which were measured systematically in 1930s, were investigated using the tool for understanding their tendencies derived from different conditions. Results can be used for enhancing final distortion in practical parts.

Papers were selected among spontaneously received papers. All papers have been reviewed according to journal procedures and standards. I sincerely thank all authors for their valuable contributions and having observed all reviewers comments and suggestions.

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