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 10 spontaneous papers discussing mechanical and microstructure properties of various materials.

The following papers have been included in this issue:

Lars Nyborg et al. investigated microstructure and material properties for 18 different graphitic cast iron materials model and focused on compacted graphite iron. Different model materials were analysed, concerning the effect of chemical composition, solidification and cooling rate on the nodularity, pearlite content, interlamellar spacing in pearlite, hardness and mechanical properties. Cutting force measurement tests were performed on some of the materials and it was found that the forces have a strong positive correlation with pearlite content.

Jayalakshmi et al. studied microstructure and mechanical properties of Mg-Al alloys. In situ synthesis of metal matrix composites is aimed to form Al_4C_3 phase carbon dioxide gas purging. Mg-Al alloys containing 7 wt.% and 9 wt.% Al were synthesised by the incorporation of CO_2 during casting, using the disintegrated melt deposition technique and were characterised after extrusion. Based on the processing-structure-property correlation, the significant influence of CO_2 incorporation and the processing methods on the microstructural and mechanical properties of the alloys are confirmed.

Gurusamy and Balasivanandha Prabu studied effect of the squeeze pressure on the mechanical properties of the squeeze cast al/sicp metal matrix composite. Microstructure examination of the squeeze cast composites showed the SiC particles distribution and the grain refinement in the Al alloy matrix due to applied pressure. The hardness and density distribution also carried out to correlate with the particles distribution. The tensile and impact strength value linearly increase with applied squeeze pressure.

Dasgupta et al. presented extrusion effect on the microstructure and properties of 2014 based particulate composites. They tried to improve the properties in cast 2014-based MMCs. The properties attained were compared between the cast and

extruded MMCs in terms of microstructure, physical, mechanical and sliding wear properties.

LiQiang Zhang and Hong Zeng discussed effect of particles size on the magnetocaloric properties in $Gd_5Si_2Ge_2$. Their results indicate that the particle size in the micrometer range can remarkably affect the MCE in the alloys. It is important to care about the appropriate choice of particle size for the magnetic refrigerant materials.

Boulares and Debili researched phase transformation in Al–Cu–Fe alloys produced by induction fusion. They investigated thermal behaviour of the conventionally solidified Al–Cu–Fe alloys prepared by magnetic induction melting with nominal compositions of $Al_{80}Cu_{14}Fe_6$, $Al_{65}Cu_{23}Fe_{12}$ and $Al_{72}Cu_{13}Fe_{15}$. They used X-ray diffraction, scanning electron microscopy, and differential thermal analysis. They found out that formation of quasi crystalline phases: may occur at the as cast state and after annealing for relatively low temperature during a short time.

Kumar et al. presented microstructure and material transfer investigation of pure titanium for rough cut surface after Wire cut EDM. Their research work is focused on experimental investigation on surface integrity in terms of machining parameters such as pulse on time, pulse off time, peak current, spark gap voltage for pure titanium in WEDM process were explored. The selected machined specimens were analysed using energy dispersive X-ray analysis (EDX), scanning electron microscope (SEM) and X-ray diffraction (XRD) techniques. It was observed from the results that there occurred significant material transfer from the dielectric as well as tool electrode on the work surface either in free form and/or in compound form. The surface integrity of rough surface was based upon the theory of electrical discharge phase and metallurgical physics.

Paulo Di Barba et al. research multi-objective optimisation of induction heating processes. The main goal of the researches was the development of new approaches, algorithms and numerical techniques for multi-objective optimisation of design of industrial induction heating installations. Various mathematical methods and algorithms for multi-objective optimisation, such as non-dominated sorting genetic algorithm (NSGA-II) and optimal control alternance method were implemented and integrated in a user-friendly package. Several optimisation procedures were tested and investigated for problem-oriented mathematical model in a number of comparative case studies. The methodology developed was planned to be applied to more complex real-life problems.

Kchaou et al. worked on characterisation of oxidation and wear oxidised surfaces of H13 steel/brass in dry sliding conditions. The microstructure and morphology of the oxides of the tow materials were characterised using X-ray diffractometer and Scanning Electron Microscope with EDX analysis. The tribological behaviour of the pair of materials is carried out on a pin-on disk wear tester after oxidation. They found out that a loose oxide film wholly covered the surface of the steel. The main oxide was identified except for a small amount of Fe_3O_4. During friction, a compacted oxide film was established on the worn surface of the steel. The analysis of the worn surface showed delamination region of tribo-oxide during wear and an undelamination region characterised by the dominance of Fe_3O_4 tribo-oxides.

Mnif et al. presented tribological failure of ball valve seals. The investigation of the failure was carried out by using several experimental tests including optical microscopy and scanning electron microscopy SEM. Experimental results revealed that the friction behaviour of polymeric seal depends strongly on the clamping load of seal and the

manipulation frequency of counterface ball. Optical microscope observation of the worn surface showed that strong adhesion of the polymeric transfer layer to the counterface ball.

All papers have been reviewed according to journal procedures and standards. I sincerely thank to 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.