
Editorial

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Biographical notes: Janez Grum is a Professor of Materials Science, Heat Treatment and Surface Engineering. He is also the Founder and Editor-in-Chief of a new journal, the *Int. Journal of Microstructure and Materials Properties (IJMMP)* and has been Editor of the *Non-Destructive Testing News* issued by the Slovenian NDT Society. He has published more than 200 refereed journal papers and more than 400 conference papers. He has published five books with several reprints and five book chapters at ASM, Marcel Dekker and Taylor & Francis publishers.

It has been five years since we started issuing *Int. Journal of Microstructure and Materials Properties – IJMMP* and it is the second year our journal has become a bimonthly, which means six issues per year. Such a frequency of issues requires very intense cooperation of authors, the editor and reviewers to make the publication period as short as possible. It is our goal to assure the independence of reviewers in the individual thematic fields, which will eventually contribute to an increased quality of papers published. I am proud to present you volume 5 number 6. This issue comprises eight papers discussing investigations conducted on various fields of materials and materials properties.

Reyes et al. studied light-beam soldering of a lead free alloy. Various processing parameters such as power, beam speed, wire feeding speed and the use of external flux were varied to obtain the optimal conditions. All the joints were visually inspected for external defects, and the thickness of the intermetallic compound layer was measured by optical microscopy. The five combinations that resulted with the least amount of defects were tested in tension to evaluate their load bearing capacity. Additional tests were conducted on pads soldered and aged to study the intermetallic compound thickness growth and its effect on the load bearing capacity. The results indicate that the load bearing capacity of the soldered joints increases with intermetallic layer thickens.

Yao et al. discussed a fully coupled constitutive model for steel quench. The residual stresses and distortion induced by quenching in an eccentric ring made of AISI 52900 steel were investigated with finite element method. Temperature-displacement analysis was performed to simulate heat transfer, phase transformations, mechanical stresses and strains during the heating and subsequent quenching processes. Commercial FEA package ABAQUS was used for the analyses along with user subroutines developed by the authors to model the thermal and mechanical constitutive behaviour. By incorporating transformation plasticity model, the residual stress and distortion of an eccentric ring during oil quenching were computed. The predicted stresses are compared with those without considering phase transformation and transformation plasticity. The comparisons

show that transformation plasticity has significant influence on residual stress profiles. Modelling results considering transformation plasticity are consistent with measurement results of quenching distortion.

Abu Shreehah and Al-Qawabeha report the results of experimental study of different diamond pressing and shot peening variables on surface roughness, microhardness, and microstructure of heat treated alloy steel (D2). The results showed that diamond pressing could increase the surface hardness under the selected specified conditions. Contrary to shot peening, diamond pressing significantly improves the smoothness of the steel surfaces.

Sapra et al studied erosion-corrosion behaviour of ni-based superalloy in the real service environment of the boiler. The investigation results assist in proper selection of boiler tube materials in reducing erosion- corrosion in power generation facilities. The nature and chemical composition of the corrosion products have been characterised with respect to surface morphology, phase composition and element concentration.

Zahir Hasan studied the mechanical properties of sintered alumina, calcined alumina (99%) and alumina zircon which are used as implants in human hard tissues. The powders were compacted at six-level of compaction load and sintered at 1,550°C for two-hours. Mechanical properties and wear volume of the compacts were studied.

Sambath et al. discussed automatic detection of defects in ultrasonic testing using artificial neural network. Features for discrimination of detected echoes are extracted in discrete wavelet representation and are then classified using ANN. Two different types of defect are initially considered namely crack and porosity. The results showed that the algorithms developed and applied to ultrasonic signals are highly reliable and precise for online quality monitoring.

Kavei and Ahmadi are dealing with crystal structure and crystallite binding as a result of hot pressing of the thermoelectric materials. The crystal of this compound was prepared then, pulverised in a particle size ratio and hot pressing sintered. To find out the temperatures effects on thermal conductivity of the sample it was systematically investigated in nanoscale intrinsic structures by systems of X-ray diffraction, scanning electron microscopy and atomic force microscopy. The acquired images ensured to show homogeneous structures for hot pressed samples.

I believe the present issue brings to the readers new views and further information about materials and microstructures which significantly influence the properties.

Special thanks are due to the authors of the papers and particularly reviewers, who ensured high quality of the papers published in the present issue.