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Editorial

Special Issue on Microstructural and Mechanical Properties of Metallic Materials, Volume II

Young-Min Kim

Advanced Joining & Additive Manufacturing R&D Department, Korea Institute of Industrial Technology, 156 Gaetbeol-ro, Yeonsu-Gu, Incheon 21999, Republic of Korea; ymkim77@kitech.re.kr

Various metallic materials are applied to industrial fields and everyday life. The mechanical properties or behaviors of materials are often governed by their microstructural characteristics. It is also possible to improve the mechanical properties of materials through microstructural evolution using various methods, such as heat treatment, surface treatment and plastic deformation. Therefore, analyzing the microstructural properties of metallic materials helps us to understand the mechanisms of materials' mechanical behavior, and to optimize the manufacturing process of these materials.

This Special Issue covers all aspects of the microstructure and the mechanical properties of metallic materials, including conventional ferrous and nonferrous alloys subjected to different processing methods. Studies focusing on theoretical simulations and experimental analysis of the microstructure and mechanical behavior of metallic materials are also covered.

A total of seven research papers covering various fields of microstructure and the mechanical properties of metallic materials, including steel, aluminum alloy, titanium and metal matrix composite, are presented in this Special Issue. Kim et al. [1] report the effect of magnesium and manganese contents on the mechanical properties of GMA welds of aluminum alloys. Additionally, Kim reports that when the magnesium content of the filler wire used for aluminum alloy GMA welding is high (6 wt.% or more), the manganese content, rather than the magnesium content, had a dominant effect on the strength improvement of the weld. Nam et al. [2] fabricated TiC-reinforced metal matrix composites using laser cladding and FeCrCoNiAlTiC high entropy alloy powder, and reported that the heat of the laser formed a TiC phase which was consistent with the thermodynamic calculation, and produced a coating layer without interfacial defects. Huang et al. [3] designed a Cr-Co-Ni-Ta eutectic intermediate entropy alloy (EMEA) using the CALPHAD method, and experimental studies to obtain high-phase stability and excellent mechanical properties. Kim et al. [4] investigated the mechanical and metallurgical behavior of laser welding on 2.0 GPa HPF steel. In order to minimize the thermal effect of the weld zone, a high-intensity laser was selected as a power source, and microstructure deformation was observed. The effect on the tensile strength of the weld was studied. You et al. [5] analyzed the materials and mechanical properties of high-strength automotive steels, with strengths ranging from 590 MPa to 1500 MPa, subjected to friction stir welding (FSW), which is a solid-phase welding process. Hirschberg et al. [6] investigated the possibility of applying Fourier transform (FT) analysis of force signal to follow fatigue behavior of metals under oscillatory displacement-controlled tests in uniaxial tension/tension. Kim et al. [7] investigated the role of anisotropy on microstructural evolution and compressive deformation characteristics by analyzing the plastic deformation behavior of rolled CP-Ti sheets, according to the RD, ND and TD loading directions.

Submissions for this Special Issue have now closed, but research on the microstructural and mechanical properties of metallic materials continues to discover and demonstrate new phenomena in a variety of metallic materials.

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