The research and development of biomaterials composed of metallic and other materials are receiving much attention. Globally, there has been an increase in the aging population; however, this problem is particularly noticeable in Japan, which has come to be known as a super aging society. In such societies, there are a number of people with failed or lost bio-functionalities, necessitating the development of highly functional implants or health care goods. Therefore, new research and development on bio-functionalization or mechanical functionalization, fabrication technologies, evaluation of the in vivo or vitro bio-compatibility of structural biomaterials used for constructing implants, and furthermore an understanding of tissue structures to which biomaterials are applied are highly important.

Ti-2015, the 13th World Conference on Ti, was held from August 16 to 20, 2015 at San Diego, USA. The 10th World Biomaterials Congress was held from May 17–22, 2016, at Montreal in Canada. Thermec’2016, International Conference on Processing and Manufacturing of Advanced Materials, also was held May 29 to June 3, 2016 at Graz in Austria. In these international conferences, a large number of topics concerning metallic structural biomaterials and other kinds of structural biomaterials were presented.

In light of this, this special issue invites overviews and original technical papers on the design and development of structural biomaterials including biocompatible shape memory alloys or biodegradable biomaterials, and bio-functionalization by surface modifications, powder metallurgy including accumulated manufacturing, wrought processing, corrosion behaviors, mechanical and biological bio-compatibility of biomaterials, and furthermore characteristics of tissues to which biomaterials are applied.

In this special issue, totally 19 papers on metallic biomaterials including Ti, Co-Cr-Mo, Mg, Zr and TiNi alloys, and stainless steels including their fabrication processes, mechanical property evaluations, surface modifications, cytocompatibility, animal testing, etc., antibacterial invert glasses, and ultrahigh-molecular-polyethylene knee components are included.

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