

Preface

Since their first introduction, metallic biomaterials have always been designed to be corrosion resistant. For decades, this paradigm has become the mainframe of the biomaterials world. It has been cited in thousands of scientific papers and taught in hundreds of courses of materials for biomedical devices. It has also been followed by industries in developing millions of medical devices until today.

Nowadays, with the advent of tissue engineering, biomaterials are envisaged to actively interact with the body. Metallic biomaterials are no more required to be inert but they should be able to assist and promote the healing process. In many cases, they should do their job and step away thereafter. This idea opens an extreme new horizon and provides new insight. One can imagine designing a material which is able to provide mechanical support for a required time and then progressively degrade. This idea directly breaks the paradigm of corrosion-resistant biomaterials.

Hundreds of publications on biodegradable metals are scattered in many journals since the first one published in 2001. Three consecutive annual international symposiums devoted to this emerging field have been held in Berlin (2009), Maratea (2010), and Quebec City (2011). Papers presented in those symposiums were published in special issues in *Acta Biomaterialia* (2010) and *Materials Science and Engineering B* (2011). This book, *Biodegradable Metals: From Concept to Applications*, should be the first to organize the scientific values of biodegradable metals research since the first decade of its development.

This book contains two main parts, each consisting of three chapters. The first part introduces the readers to the field of metallic biomaterials, exposes the state of the art of biodegradable metals, and reveals its application for cardiovascular implants. They were mostly compiled from the following publications: Hermawan et al. (2009a, 2010a, 2010b, 2011). The second part exposes an example of biodegradable metals from its concept to applications where a complete study on metallic biodegradable stent is detailed from materials design, development, testing till the implant fabrication. The second part was mostly compiled from my previous works on Fe-based alloys for biodegradable stents, mainly from my doctoral thesis submitted to Laval University in 2009, entitled: ‘Conception,

développement et validation d'alliages métalliques dégradables utilisés en chirurgie endovasculaire', with updates and benchmarking with recent similar works from other authors up to 2012.

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