Bioactive metallic surfaces for bone tissue engineering



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Abstract

Metals and their alloys have played a main role as structural biomaterials in reconstructive surgical procedures, particularly orthopedics, with more recent uses in nonosseous tissues, such as blood vessels. Recently, there has been an increasing trend in research focusing on improving the performance of the biomedical implants. The clinicians used metallic implants to treat bone imperfections and fractures. Currently metallic biomaterials like stainless steel, Co-Cr alloys, Ti and its alloys are being used significantly as implantable biomaterials for their good mechanical properties, but they failed to prove long-term durability and did not build a sufficient bond with human bone. Since human tissue is structured mainly of self-assembled polymers (proteins) and ceramics (bone minerals), with metals present as trace elements with molecular scale functions, the necessity for innovation and development of smart bioactive materials, which can generate a chemical bond with bones, with improved functional and biocompatible properties, either by employing surface engineering or through improving process parameters has been felt for application. This chapter aims to give a comprehensive summary of metals and its alloy, bioactive coating, different coating techniques, and the advantages and disadvantages of bioactive coating and the applications of metals and alloys as implants.

Keywords: Metals and alloys; bone tissue engineering; bioactive coating

4.1 Introduction

Tissue engineering and regenerative medicine is of paramount importance and has become integrated into the medical field by the regeneration of the normal biological functions of the tissues or organs via the rational combination of cells, biomimetic matrices, biological signals, and biophysical cues themselves, within







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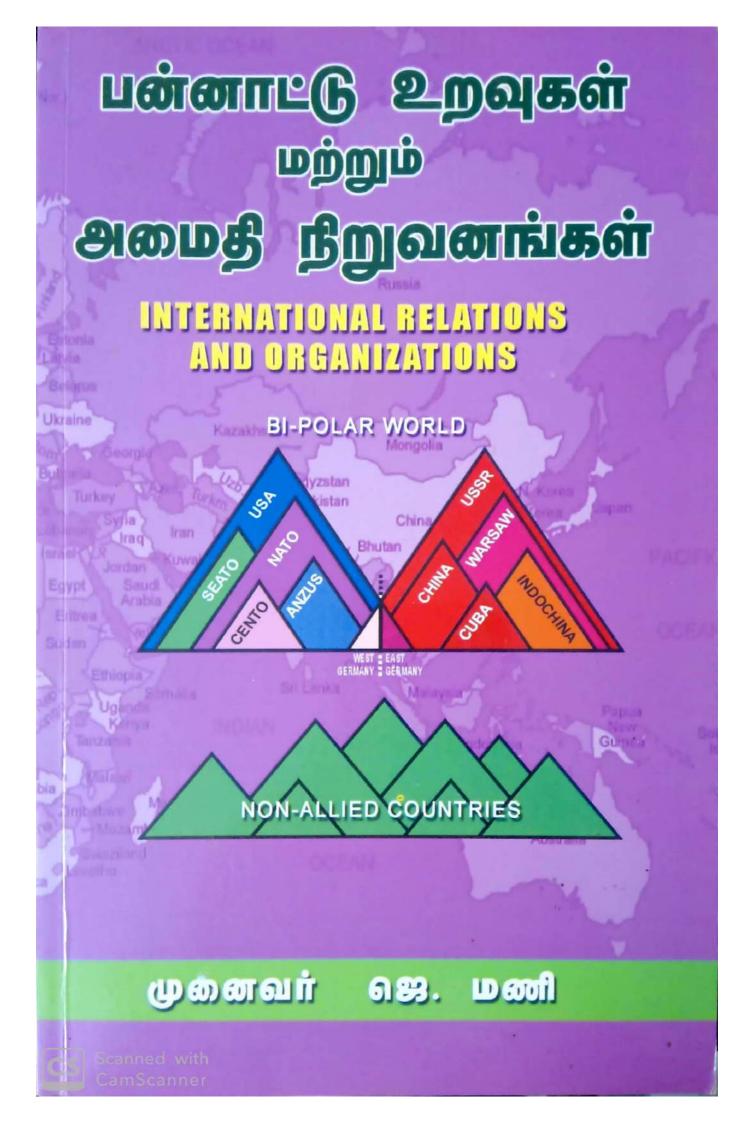
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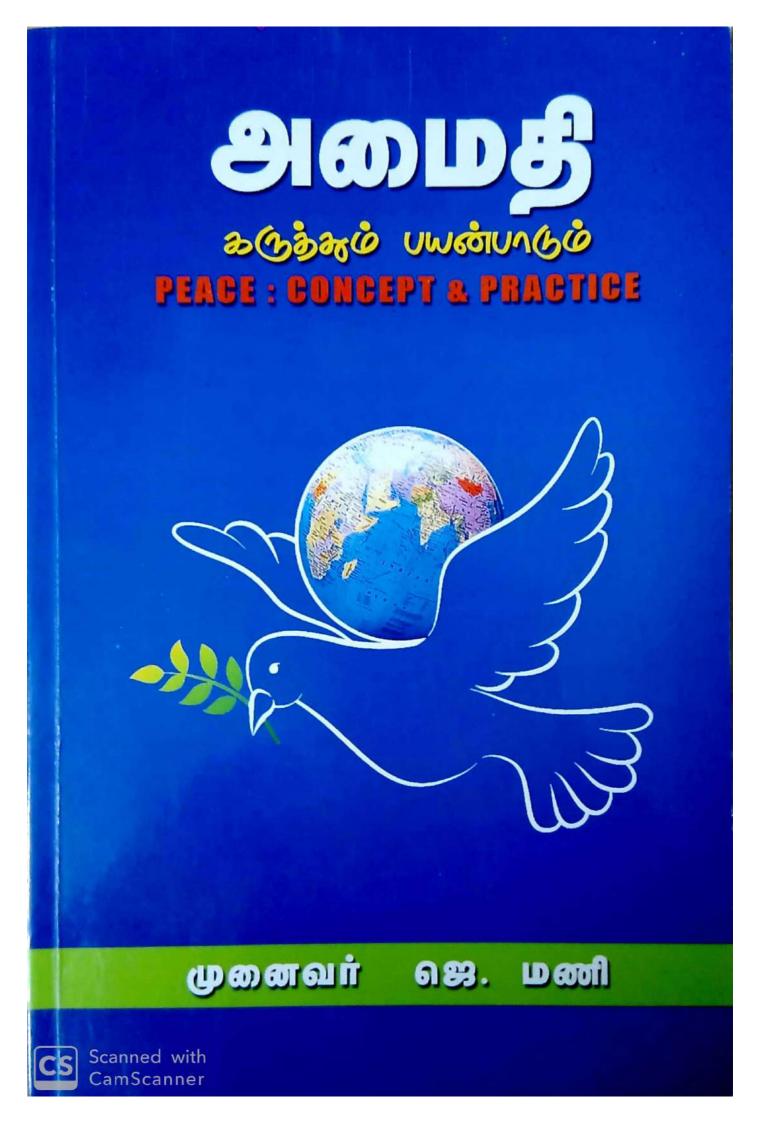
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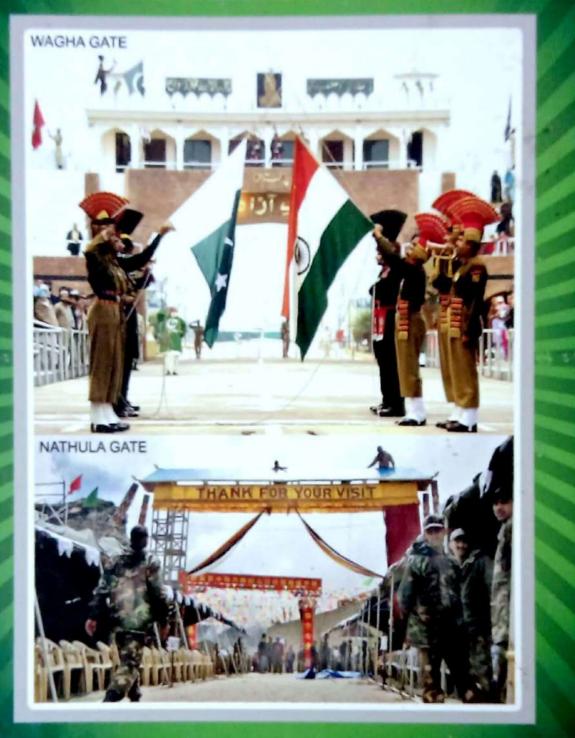
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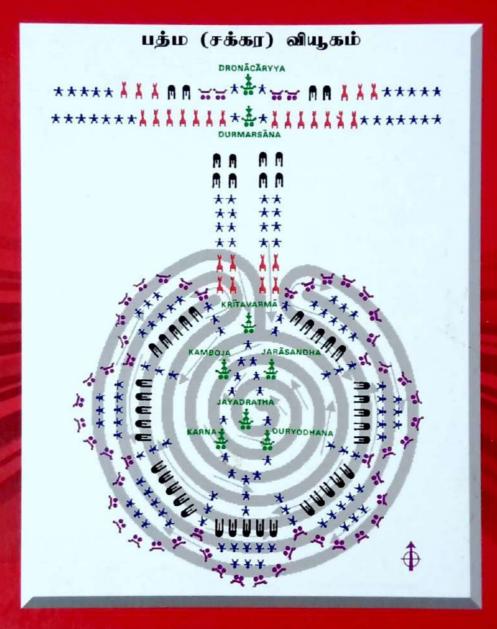
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