Fabrication and Characterization of $\text{Mg}(\text{OH})_2$ Films on AZ31 Magnesium Alloy by Alkali Treatment

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Mg and its alloys have shown potential application as a bio-absorbable biomaterial, such as for bone screws and plates, however, their fast corrosion rate may result in the sudden failure of the implants. In this paper, compact and dense films are formed on AZ31 magnesium alloy by alkali treatment. The microstructure and composition of the films are examined by SEM, EDS and XRD, respectively. The bonding strength and corrosion behaviour of the films are characterized by tensile strength test, potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) studies. The results show that the main composition of the films is $\text{Mg}(\text{OH})_2$, the bonding strength between the film and the substrate is stronger than 60 MPa. And the corrosion resistance is improved by the alkali treatment compared with that of the bare AZ31 magnesium alloy in the simulated body fluid (SBF) solution. It is increased with increasing the treatment time.

Keywords: Magnesium alloy; Alkali treatment; Magnesium hydroxide; Bonding strength; Corrosion; Biomaterial

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