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Preparation and evaluation of silicon-containing coatings on bioabsorbable Mg/27.5HA nanocomposite for bone tissue engineering

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A powder metallurgy technique to fabricate silicon and magnesium-oxide coated magnesium-based bionanocomposite with hydroxyapatite has been developed. The sample coated with double layer MgO/Si was compared with bare Mg/27.5HA nanocomposite and the sample coated by Si layer only. The surface microstructure and the cross section of bare and coated samples before and after corrosion were examined by field-emission scanning electron microscopy (FE-SEM). The corrosion performance of bare and coated samples was evaluated using potentiodynamic polarization, electrochemical impedance spectroscopy and immersion tests. A decrease from 4.28 to 0.65 mm/year was observed in corrosion rate of Mg/27.5HA nanocomposite with monolayer Si-coating. The results indicated that the corrosion resistance of Mg/27.5HA nanocomposite was significantly improved by MgO/Si double layer coating. Moreover, MgO/Si coating is promising to enhance biocompatibility of Mg/27.5HA nanocomposite for implant application. Antibacterial tests of the bare and coated samples revealed their antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*.

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