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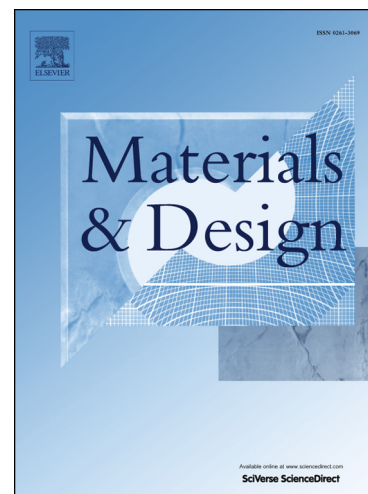
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Biodegradable Mg-Zn-Ca-Sr bulk metallic glasses with enhanced corrosion performance for biomedical applications

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Abstract:

Magnesium alloys with the integration of suitable corrosion behavior and good mechanical properties are desired for biodegradable materials. In this paper, novel biodegradable Mg-based bulk metallic glasses (BMGs) were synthesized in the Mg-Zn-Ca-Sr alloy system. Compared with the Mg-Zn-Ca BMG, the Mg-Zn-Ca-Sr BMGs with minor Sr incorporation possess improved glass-forming ability, better mechanical properties, enhanced and adjustable corrosion performance, reduced hydrogen evolution, and comparable cytocompatibility, indicating their promising potential to serve as biodegradable materials. The enhanced corrosion resistance of the Sr-incorporated BMGs is ascribed to the higher amount of the zinc hydroxide/oxide in the alloy surface, and a schematic model is proposed to illustrate the corrosion mechanisms of the Mg-Zn-Ca-Sr BMGs.

Keywords: Magnesium alloy; Biodegradable material; Bulk metallic glass; Mechanical property; Corrosion behavior

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