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One-step fabrication of biomimetic superhydrophobic surface by electrodeposition on magnesium alloy and its corrosion inhibition

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ABSTRACT

A facile, rapid and one-step electrodeposition process has been employed to construct a superhydrophobic surface with micro/nano scale structure on a Mg-Sn-Zn (TZ51) alloy, which is expected to be applied as a biodegradable biomedical implant materials. By changing the electrodeposition time, the maximum contact angle of the droplet was observed as high as $160.4^\circ \pm 0.7^\circ$. The characteristics of the as-prepared surface were conducted by field emission scanning electron microscopy (FE-SEM), X-ray photoelectron spectroscopy (XPS) and Fourier-transform infrared spectroscopy (FT-IR). Besides, the anti-corrosion performance of the coatings in stimulated body fluid (SBF) solution were investigated by electrochemical measurement. The results demonstrated that the anti-corrosion property of superhydrophobic surface was greatly improved. This method show beneficial effects on the wettability and corrosion behavior, and therefore provides a efficient route to mitigate the undesirable rapid corrosion of magnesium alloy in favor of application for clinical field.

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