Title:	Reactive coating modification of metal material with strong bonding strength and enhanced corrosion resistance for high-performance bioelectrode of microbial electrochemical technologies
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Abstract:	Surface modification can endow metal materials excellent biocompatibility and enable their use as bioelectrodes in microbial electrochemical technologies (METs). However, achieving the firmness of the modification layer and corrosion resistance of the modified metal electrodes, which are crucial for the practical application of METs, is challenging. Moreover, no efficient surface modification strategy that can be applied to different types and configurations of metal materials has been reported yet. In this study, we present a universally applicable strategy of metal surface modification, named reactive coating, for preparing high-performance scalable bioelectrodes for METs. The coating layer develops a strong interaction with the metal substrate that can tolerate ultrasonic striking, and endows the metal electrode an enhanced corrosion resistance and excellent bioelectrocatalytic activity. The proposed reactive coating method is applicable not only to different types of metal surfaces, but is also equally effective on the porous substrates. A high projected current density of nearly 15 mA cm-2 and a volumetric current density of around 78 mA cm-3 are achieved with the modified macro-channeled stainless steel and nickel foam bioelectrodes, respectively. These represent the highest values for any bioelectrodes reported in METs to date.
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