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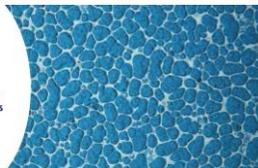
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# Electrochemical investigation of biochar nanoparticles incorporated zinc-rich epoxy coatings

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Biochar nanoparticles (BCN) derived from spruce wood and wheat straw were prepared and incorporated into zinc-rich epoxy coating systems, with the aim of improving utilization rate of zinc particles and the general anticorrosive performance. Formulations with different dosage (0.4 wt%, 0.8 wt% and 1.6 wt%) of BCN were immersed in 3.5% NaCl solution for 35 days during which the electrochemical impedance spectroscopy measurement was carried out. The impedance at 0.01 Hz indicated that addition of spruce wood BCN may have induced formation of more zinc corrosion products, which enhanced the coating impedance. Three equivalent circuit models were proposed based on the degradation mechanism and the shape of Nyquist curve. Accordingly, the fitted EIS data showed that addition of spruce wood BCN (0.4 wt%, 0.8 wt% and 1.6 wt%) and wheat straw BCN (1.6 wt%) could probably impart positive effects on anticorrosive properties and there was no obvious improvement of the coating anticorrosive performance with lower dosages (0.4 wt% and 0.8 wt%) of ST. Results also showed that wheat straw BCN addition has the potential to alleviate coating water uptake.