Design of conducting polymer based smart coating: A focus on corrosion inhibitor transport mechanisms

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Abstract Conducting polymers were widely used as filler or coating to protect metal components against corrosion. One of the interesting points is that the reduction of the conducting polymer to release counterions (Where the counterions are the anionic corrosion inhibitors) and then transport to the defect sites to provide active corrosion protection. However, an interesting question is when the released corrosion inhibitor or counterions fail to reach the critical concentration or are unable to effectively migrate to the corrosive sites, thereby hindering self-healing at the damaged areas. To realize high corrosion inhibitor loading capacity and effective transportation, a strategy termed 'first transport, then entrap' was proposed. In this approach, the transportation properties of the corrosion inhibitors are first investigated, followed by designing the entrapment of the corrosion inhibitor into the coating matrix. Our findings suggest that this strategy has great potential for designing smart coatings based on micro/nano container.

Keywords Conducting polymer; Ionic transportation; Smart coating; Corrosion inhibitor; Scanning Kelvin Probe (SKP)

Reference

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