Stimuli-Responsive Polymers for Anticorrosion

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Corrosion is a crucial issue in Thailand as it accounts for huge financial losses every year. One of the major methods for corrosion protection is to use corrosion inhibitors embedded in coatings for metals. However, corrosion inhibitors are leaching with time to the environment so that their release occurs even in absence of corrosion.
To overcome this issue, corrosion inhibitors can be encapsulated in stimuli-responsive nanomaterials [1]. Recently, we investigated the preparation and application of polymers conjugated with corrosion inhibitors via acid-cleavable linkages [2]. Monomers and polymers were designed to contain self-immolative, imine, hydrazone, and thiopropionate groups [Gift, Nia]. The polymers could be processed as nanoparticles or coatings to study the release kinetics of corrosion inhibitors. Selectivity and released amount were dependent on the type of acid-labile bond as well as the hydrophobicity of the polymer. For the first time, we designed polymers with hemiaminal ether linkages for controlled release. Highly selective release of inhibitors was observed so that sustained release was possible in mild acidic conditions. The polymers are further investigated for their anticorrosion properties. We believe that such bonds are also suitable for biomedical applications requiring release of drugs in mild acidic conditions.

References

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