



Chapter

Biopolymer Composites and Nanocomposites for Corrosion Protection of Industrial Metal Substrates

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ABSTRACT

Corrosion is a critical problem that can be found in all industries worldwide. Corrosion is particularly serious in the petroleum industry, due to the large amounts of metallic based assets located throughout the entire supply chain. Annual costs of corrosion and its consequences are estimated to be 3 – 5 % of GDP for developed countries of the world. Corrosion mitigation strategies adopted by some industries include materials selection, coatings and linings, cathodic protection and the use of corrosion inhibitors amongst others. The use of biopolymers for corrosion protection of industrial metal substrates

particularly as corrosion inhibitors has generated interest globally because they are considered as environmentally friendly in addition to the possession of multiple adsorption centres. However, it is found that most biopolymers studied function as moderate corrosion inhibitors. Some of the steps taken to offset this drawback include copolymerization, addition of substances to exert synergistic action as well as the incorporation of inorganic substances in nano-size into the biopolymer matrix in order to improve the corrosion inhibition performances of the biopolymers. The application of biopolymer composites and nanocomposites as anticorrosion materials has shown promising results and is believed to form metal chelate which could block metal surfaces from aggressive ions present in corrosive media. In this chapter, the application of composites and nanocomposites of biopolymers such as chitosan, carboxyl methylcellulose, gum Arabic, Xanthan gum for corrosion protection of industrial metal substrates in different corrosive media is discussed.

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