

## Chapter 11

### Nanohybrid Polyaniline as Corrosion Resistance Coating Formulation on Iron-based Surface

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#### Abstract

Metallic corrosion is one of the hazardous components that hugely affect the economy of any country. Therefore, a huge research effort is devoted to the urgent basis of the fabrication of efficient anti-corrosion coating. Among different conducting polymers, polyaniline is widely used in effective coating formulation with different nanostructural additives/pigments like titanium oxide, zinc oxide, graphene analogs, carbon nanotube, etc. to impart various protection routes like anodic and cathodic protection, barrier protection, etc to the surface of the iron. This chapter deals with the brief introduction of polyaniline as the widely used conducting polymer along with the reports of some novel nanohybrid coating formulations on the iron-based surface.

**Keywords:** Polyaniline, Nanohybrid, Anti-corrosion, Steel surface, the Coating formulation

#### 11.1. Introduction:

Corrosion is a severe issue to the present economy of the nation as it leads to the loss of around 2 - 5% of the “Gross Nation Product” (GNP) of any nation [1]. In India, this value is around 25,000 crores rupees every year as reported by Newsletter NACE, India [2]. The corrosion of metals relies upon different phenomena identified with nature in which it happens. These phenomena are attributed to the nature and structures of the materials. The most widely recognized approach to arrest the corrosion is to apply an impermeable coating onto the surface. The role of the surface coating is therefore to limit the effect of oxidizing factors such as oxygen and water by developing physical barriers. Recently, conducting polymers are gaining limelight because of their various applications and industrial interest [3]. The low-cost conducting polymers are also known for their versatility in chemical, physical, and mechanical properties and applied in various important applications including batteries, supercapacitors, biosensors, etc. Moreover, conducting polymers are well-acknowledged for their anticorrosion behaviours towards aluminum, carbon steel, copper, stainless steel, etc. Conducting polymers are lightweight, flexible, and electrically conductive like metal or semiconductor. Therefore,