pH-Responsive Nanocapsules as Smart Coating for Corrosion Protection: A Review

N. S. Mohamed, J. Alias, N. A. Johari, and A. Zanurin

Abstract A new generation of smart coating contain nano capsule that actively respond to changes in the local environment has triggered great interest among material researchers in the field of anti-corrosion. Many researchers reported that the preparation of pH-responsive nano capsules is usually applying unfriendly chemicals, a complex procedure and time-consuming, which remains as a great challenge for effective corrosion protections. This review presents, the achievement during the last 10 years in the field of pH-responsive nano-capsules, the formulation technique of such nano-capsule, testing and evaluation of the pH-responsive nano-capsule.

Keywords pH response · Nano-capsules · Self-healing

1 Introduction

Nowadays, mankind uses huge number of various types of metal and its alloys in daily life such carbon steel, aluminum alloys, magnesium alloys and many more [1]. These materials are widely used by industrial due to the excellent mechanical properties. However, the problem of corrosion that affect the global economic and generating risks associated with safety and environment [2]. Metal usually reacts with corrosive media in the surrounding environment and resulting in damage and deterioration [3]. In order to control or mitigate the corrosion process, researcher had introduced various method such as organic coatings, corrosion inhibitor and hybrid protective coating [4].

Coatings can provide effective protection against environmental factors such as ultraviolet (UV), heat, oxygen, moisture, and ions in the short term [5]. Mechanical attack during operation can badly damage the barrier effect of the coating. If the damage is not visible and cannot be repaired, the corrosive medium will easily permeate the coating, causing coating failure [6]. At present, damage coating need

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