Investigation of Corrosion Inhibition of Welan Gum and Neem Gum on Reinforcing Steel Embedded in Concrete

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Two naturally derived gums namely Welan gum (WG) and Neem gum (NG) have been tested for their anti-corrosion potential against the steel reinforced in concrete in NaCl media at different time interval using standard corrosion characteristic techniques such as electrochemical impedance spectroscopy (EIS), Tafel polarization study (PDS) and scanning electron microscopy (SEM). The results of EIS and PDS revealed the protective film forming potential and mixed type inhibitive action of both the two gums. In addition, the formation of protective layer over embedded steel surface has been suggested by SEM. The density functional theory (DFT) results indicated the active centers of inhibitor molecules which could be attached on embedded steel surface that influence the anti-corrosion ability of WG and NG. The durability properties viz., compressive strength and split tensile strength were also improved on the introduction of gums to the concrete. The mechanism of inhibition of corrosion of steel embedded in concrete in 3.5% NaCl solution by both the two gums has also been established.

Keywords: Welan gum, Neem gum, Electrochemical impedance spectroscopy, Tafel Polarization, Density Functional Theory, Reinforced steel.

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