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PII: S1226-086X(18)30103-5
DOI: https://doi.org/doi:10.1016/j.jiec.2018.02.033
Reference: JIEC 3893

To appear in:

Received date: 7-12-2017
Revised date: 13-2-2018
Accepted date: 24-2-2018

Please cite this article as: N.N. Taheri, B. Ramezanzadeh, M. Mahdavian, G. Bahlakeh, In-situ synthesis of Zn doped polyaniline on graphene oxide for anti-corrosive reinforcement of epoxy coating, *Journal of Industrial and Engineering Chemistry* (2018), https://doi.org/10.1016/j.jiec.2018.02.033

In-situ synthesis of Zn doped polyaniline on graphene oxide for anti-corrosive reinforcement of epoxy coating

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Abstract: In this study, the negatively charged graphene oxide (GO) nanosheets were modified with polyaniline (PAni) nanofibers and zinc cations through a layer-by-layer assembly method. The structure, morphology and thermal behavior of GO, GO-PAni and GO-PAni-Zn were characterized. The active corrosion inhibition performance of GO-PAni-Zn nanocomposite was demonstrated by electrochemical impedance spectroscopy (EIS) and polarization tests. The results confirmed high cation exchange capability and better anti-corrosion properties of GO-PAni-Zn sample than others. The theoretical outcomes derived from Quantum Mechanics computations revealed that inorganic zinc cations demonstrated electrostatic and cation-π interactions with emeraldine, implying the zinc propensity to bind to PAni Chains.

Keywords: Layer-by-layer assembly; graphene oxide nanosheets, Polyaniline nanofibers, zinc cations, cation exchange capability; Anti-corrosion; quantum mechanics; EIS.

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