

Vegetable Oil-Based Anticorrosive Coatings for Metals Protection

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Abstract : The current study aims to develop anti corrosive coatings using vegetable oil (VO)-based polymers. Due to their chemical versatility, reduced costs and more important, higher hydrophobicity, VO's are great candidates in the field of anti-corrosive materials. Lignin (Ln) derivatives were also used in this research study in order to achieve performant hydrophobic anti-corrosion layers. Methods Through a rational functionalization pathway, the selected VO (linseed oil) is converted to more reactive monomer - methacrylate linseed oil (noted MLO). The synthesized MLO cover the metals surface in a thin layer and through different polymerization techniques (using visible radiation or temperature, respectively) and well-established reaction conditions, is converted to a hydrophobic coating capable to protect the metals against corrosive factors. In order to increase the anti-corrosion protection, lignin (Ln) was selected to be used together with MLO macromonomer. Thus, super hydrophobic protective coatings will be formulated. Results The selected synthetic strategy to convert the VO in more reactive compounds - MLO - has led to a functionalization degree of greater than 80%. The obtained monomers were characterized through NMR and FT-IR by monitoring the characteristic signals after each synthesis step. Using H-NMR data, the functionalization degrees were established. VO-based and also VO-Ln anti corrosion formulations were both photochemical and thermal polymerized in specific reaction conditions (initiators, temperature range, reaction time) and were tested as anticorrosive coatings. Complete and advances characterization of the synthesized materials will be presented in terms of thermal, mechanical and morphological properties. The anticorrosive properties were also evaluated and will be presented. Conclusions Through the design strategy briefly presented, new composite materials for metal corrosion protection were successfully developed, using natural derivatives: vegetable oils and lignin, respectively.

Keywords : anticorrosion protection, hydrophobe layers, lignin, methacrylates, vegetable oil

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