

## **Polymer Nano-Composite Materials Based on Hyperbranched Polymers in Petroleum Applications**

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The Petroleum sector is facing a wide variety of challenges in finding economically and safe solutions for the corrosion problem, in which a tremendous amount of different metals, especially carbon steel, are consumed as pipelines, tubing, pumps, valves and tanks. Corrosion is a problem in three major sectors in the petroleum industry: production, transportation, and storage and refinery operations. It is very important to prevent the corrosion of the metals used in pipelines due to the resulting waste of money and resources. Polymer nanocomposite materials based on hyperbranched polymers are widely used now for pipeline coatings as anti-corrosive materials.

Polycondensation and the more advanced atom transfer radical polymerization (ATRP) techniques would be used to synthesize ester-amide hyperbranched in addition to the formulation with the graphene oxide to form the anti-corrosive nanocomposites which is very challenging. My goal for this project is therefore to establish conditions for consistent preparation of the ester-amide hyperbranched polymers and nanocomposites based on graphene oxide materials with well-controlled molecular weights, and to fully characterize these polymers as anti-corrosive coatings for steel pipeline.