

WIU CENTENNIAL HONORS COLLEGE
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Abstract

Poster

Major: Chemistry

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John Determan

Functionalization of Humic Acid for Metal Extraction Using Iron Nanoparticles

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Humic acid is extracted from the humus layer of soil. Humic acid is commercially available and can be prepared from soil samples. Humic acid does not have a definitive structure but can be loosely defined as a porous carbonous net with many ring-like structures and oxygen-containing functional groups throughout the structure. Small amounts of nitrogen, phosphorous, and sulfur functional groups can be found depending on the conditions in which the humic acid was formed.

Humic acid can be used for soil fertility purposes as humic acid can help the soil retain fertilizing agents and plays an important role in nitrogen and phosphorus cycles. Humic acids also naturally have an affinity for metal binding and further modification to the structure can enhance metal binding character. The properties of nanoparticles can allow for a wide variety of applications and altered properties. For the purpose of this research, the metal binding and extraction process are affected by the nanoparticles. Iron magnetic nanoparticles are decorated with humic acid to allow for metal removal in aqueous solutions and easy extraction from the solution.

Our production and procedure of metal-binding nanoparticles are guided by articles in the American Chemical Society. The two components, humic acid and iron nanoparticles, are relatively cheap. This allows for the cost-effective production of metal removal agents for environmental applications.