Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Visible Light Photocatalytic Degradation of Congo Red Using LaFeO3 Nanofibers

Finalist's Name: Katherine Zheng

School and City: Fairview High School, Boulder

Sponsor's Name: Fei Yan

Category: Chemistry (CHEM) Division: Senior (9th - 12th grades)

Abstract (250 words or less):

Coloring dyes from various industries contribute to decreased light penetration in natural bodies of water which further alters photosynthetic activities and oxygen depletion within those ecosystems. For example, Congo Red (CR) is a carcinogenic and mutagenic chemical that has been classified as toxic to aquatic ecosystems and even in humans. My research explores the use of photocatalytic degradation to reduce the absorption of the effluents, and how to optimize the process under the more accessible parameters of visible light as opposed to the commonly used Ultraviolet light. I synthesized LaFeO3 nanofibers using electrospinning to act as a photocatalyst for degrading CR in a solution. I then characterized the absorption of the nanofibers using Ultraviolet-Visible Spectrophotometry so as to differentiate the effects of absorption and degradation. The solution was exposed to visible light which yielded a 62.3% decrease in absorption as measured by spectrophotometry. The reduction in absorption levels determined that LaFeO3 nanofibers were successful photocatalysts in the degradation of CR under visible light. Future work could entail the use of a different chemical from which to create the nanofibers and the application of this treatment on different dyes. This development of LaFeO3 nanofibers and their effective employment in photocatalytic degradation provides a critical step in achieving the optimal treatment method that can be widely accessible and upscaled to use in larger industries.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: Date: 02.27.24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES o all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.