

MATERIALS ENGINEERING

SEMINAR

“The Optical Property of Nanostructured Au”

By

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Purdue MSE Preliminary Exam

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ABSTRACT

For many centuries, humans have experimented with the optical effects of gold (Au) nanoparticles in glass, as observed in the Lycurgus cup. Such optical effects were not scientifically explained till the early 20th century, at which point the door was opened to research into synthesizing different shapes of nanostructured Au and applying the results to different fields. In this presentation, the basic fundamental background will be introduced based on light interactions with plasmonic Au. According to the physical model of the light-matter interaction the shape, size and surrounding media are important when plasmonic Au responds to light. For example, nanoparticles have one plasmonic peak in the visible range of the electromagnetic spectrum, but nanorods have two different plasmonic peaks—one in the visible-range and the other in the infrared region. Controlling the size and the shape is important in optimizing the optical effects. This control will require understanding of the mechanism of the growth of Au in the chemical synthesis method. Using physical vapor deposition to obtain Vertically Aligned Nanocomposites (VANs) is another method to control the nanostructured Au. The method of using strain between phases to form VANs, and examples of oxide-Au and nitride-Au systems, will be discussed. An application of VAN systems to obtain a porous structure will be presented. Furthermore, applications of Au nanomaterials in photovoltaic and spectroscopy will be discussed. Last, critical review on the Au nanostructures will also be presented and future research directions in Au nanostructure tuning are proposed.

Date: Monday, November 21, 2022

Time: 1:00pm

Place: WANG 1004 or via WebEx

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- Meeting number (access code): 2621 524 5037
- Meeting password: rM42WXmJTh4