Bhattacharyya's paper published in National Academy of Science

Posted - May 25, 2011

Dr. Dibakar Bhattacharyya's paper "Reactive nanostructured membranes for water purification" was recently published in the Proceedings of the National Academy of Sciences (PNAS). Dr. Bhattacharyya (DB) is Professor in the Chemical and Materials Engineering Department of the University of Kentucky. Graduate student Scott Lewis also made significant contributions to the research and the paper, which discusses a new, low energy technology, based on membranes, to degrade toxins (such as bacteria, viruses, or endocrine disruptors) in water. The membranes harness naturally occurring enzymes to catalyze the destruction of toxic molecules in water.

Reactive nanostructured membranes for water purification

Researchers have designed a double membrane that uses glucose, iron, and a common enzyme to detoxify groundwater. Dibakar Bhattacharyya and colleagues stacked two membranes that worked together to neutralize water contaminants.

The top membrane provided glucose and enzymes to generate initial chemical reactants. The bottom, iron-loaded membrane completed the reaction to break down organic compounds such as pesticides and degreasing solvents. Because the glucose and iron are incorporated within the membranes, and the process does not create toxic byproducts, traditional additions or subtractions of harmful chemicals are unnecessary, the authors report. To illustrate the membranes' real-world applicability, the researchers mixed iron oxide particles and hydrogen peroxide in a similar reaction to degrade trichloroethylene (TCE), a potentially carcinogenic compound, in contaminated groundwater. The authors report that approximately two-thirds of the most serious hazardous waste sites in the United States are contaminated with TCE. Though the membranes were developed and tested for environmental applications, the technique could also be used to kill bacteria or inactivate viruses within a water supply, the authors suggest.