NJIT professor develops biologically-inspired catalysis active, yet inert materials

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NJIT Associate Professor Sergiu M. Gorun is leading a research team to develop biologically-inspired catalysis active, yet inert, materials. The work is based on organic catalytic framework made sturdy by the replacement of carbon-hydrogen bonds with a combination of aromatic and aliphatic carbon-fluorine bonds. Graduate students involved with this research recently received first place recognition at the annual NJIT Dana Knox student research showcase.

The newest focus of Gorun's research has been the cobalt complex as a catalyst for which the known degradation pathways appear to have been suppressed. "Broadening the Reactivity Spectrum of a Phthalocyanine Catalyst While Suppressing Its Nucleophilic, Electrophilic and Radical Degradation Pathways" by Gorun and others appeared in the web issue of *Dalton Transactions* (2011), ASAP Communication. Similar to a previous publication, this recent one addresses an important industrial process, the "sweetening" of petroleum products by the transformation of smelly and corrosive thiols into disufides. The extreme electronic deficiency of the new catalyst metal center allows it to process molecules that are not reactive in the presence of regular catalysts that perform this chemistry industrially.

Two years ago Gorun and his team reported that the related zinc perfluoroalkylated phthalocyanine, a molecule resembling the porphyrin core of several heme enzymes, exhibit highly-efficient photochemical oxygenation of an organic substrate. This was of great interest to the fragrance industry ("Rational design of a reactive yet stable organic-

based photocatalyst" Dalton Transactions, 2009, 1098).

Concurrently, the unusual properties of Gorun's new materials are explored in parallel in constructing surface coatings, an area in which Gorun was awarded US patent 7,670,684. Several publications describe the properties of the new coatings.

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