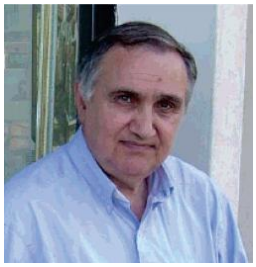
STONY BROOK UNIVERSITY
ADVANCED ENERGY
RESEARCH AND TECHNOLOGY CENTER



AERTC Distinguished Lecture Series

Dr. Nick Serpone

Professor, Concordia University, Montreal, Canada, Emeritus
Visiting Professor, University of Pavia, Pavia, Italy
Visiting NSF Program Director, Chemical Sciences

Date: Wednesday, May 7th

Location: Room 231, Engineering

Time: 12:30 PM

Titanium Dioxide and Sunscreens: *Do Sunscreens Protect from UVB/UVA Radiation*

OR are we playing Russian roulette?

Minerals such as TiO_2 (bandgap energy = 3.2 eV – anatase; for rutile, 3.0 eV) and ZnO (3.2 eV) are well known active semiconductor photocatalysts used extensively in heterogeneous photocatalysis to destroy environmental organic pollutants. They are also extensively used in sunscreen lotions as active broadband sunscreens that screen both UVB (290–320 nm) and UVA (320–400 nm) sunlight radiation and as high SPF makers. When so photoactivated by UV light, however, these two particular metal oxides generate highly oxidizing radicals ($^{\bullet}OH$ and $O_2^{\bullet-}$) and other reactive oxygen species (ROS) such as H_2O_2 and singlet oxygen, $^1O_2$, well known to be cytotoxic and/or genotoxic . Hydroxyl ($^{\bullet}OH$) radicals photo-generated from photoactive TiO_2 samples extracted from commercial sunscreen lotions induce damage to DNA plasmids *in vitro* and to whole human skin cells in cultures [1]. Accordingly, the TiO_2 particle surface has been modified to produce specimens of considerably reduced photoactivity. Deactivation of TiO_2 diminishes considerably, in some cases completely, the damage caused to DNA plasmids, to human cells, and to yeast cells compared to non-modified TiO_2 exposed to UVB/UVA simulated solar radiation [**1**]. Ceria (CeO_2; bandgap 3.1 eV) behaves in a manner otherwise similar to TiO_2 and ZnO . The environmental implications of these compounds will be presented.

[1] N. Serpone, A. Salinaro, S. Horikoshi, H. Hidaka, “Beneficial effects of photo-inactive titanium dioxide specimens on plasmid DNA, human cells and yeast cells exposed to UVA/UVB simulated sunlight”, *J. Photochem. Photobiol. A:Chem*. 179 (2006) 200–212.