

Aspects of Nanotechnology
In
Inorganic Sunscreen Dispersions:
Efficacy and Aesthetics

Chemists must take into consideration more factors to formulate with inorganic sunscreens than many other active ingredients including organic sunscreens. Because the UV radiation attenuation grade particles of Titanium Dioxide and Zinc Oxide are in the nanometer range, the state of their dispersion in the product film on the skin governs their efficacy and aesthetics.

Our research with dispersions of these inorganic particles demonstrates that properties of the particles themselves, including size, shape and coating and the media they are dispersed in, whether lipophilic or hydrophilic impact their performance. In the final formulation even the same dispersion can give different results depending on the formulation and process. Agglomeration state of particles in the skin film gives variable ratios of UVA, UVB and visible light absorption resulting in more or less transparent and more or less efficacious sun protection efficacy.

Inorganic particles interact with light as both inert reflectors and diffractors and as electromagnetic absorbers. By looking at *in vitro* instrumental measurements and *in vivo* clinical results for efficacy and product draw down films and consumer use results we have constructed a matrix of physical properties versus activity in use showing that dispersions themselves are superior to simple powder active but composition and processing of the dispersions results in very divergent finished skin care products.