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EFFECTIVENESS IN UV ABSORPTION OF HIERARCHICAL NANO ZNO-MICROTiO₂ COMPOSITES WITH PHOTODEGRADATION INHIBITION

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Nowadays, sunscreens are formulated by using TiO₂ and ZnO nanoparticles because they are efficient inorganic UV filters. In fact micro sized TiO₂ and ZnO have been increasingly replaced by TiO₂ and ZnO nanoparticles in order to solve the cosmetic drawback of the white opaque sunscreens apart from the higher yield that nanoparticles suppose. Also the aggregation state of the particles in sunscreens is related to the solar protection factor (SPF) of the final emulsion. In this sense, dispersed nanoparticles into sunscreens increase the SPF value, but it means a possible leading to their incorporation into the stratum corneum, the outer layer of the skin. Moreover, when TiO₂ is irradiated produces free radicals which are implicated in a number of potential health issues such as skin aging because of the formation of reactive oxygen species (ROS). In this work, composites combining TiO₂ micro particles and ZnO nanoparticles have been achieved by

using several synthesis and dispersion methods. It has been demonstrated by the incorporation of the different composites into sunscreens that the presence of nanoparticles anchored over TiO₂ micro particles allows increasing the efficiency of nanoparticles but decreases the possible health problems by their absorption as nanoparticles. The aim of these new composites is to gain the advantages of inorganic nanoparticles avoiding their potential drawbacks. Hence, the combination of both oxides provokes higher SPF value and lower photodegradation, in comparison with TiO₂ micro particles. Moreover, the disposition of ZnO and TiO₂ particles means a positive synergy by the recombination of photo induced electrons holes, which decreases the formation of free radicals.

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