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“*Cosmetical and cosmeceutical Bioceramic materials in the third millennium between fake and facts*”

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Abstract

Cosmetic pleasantness of product containing inorganic UV filters depends on an unwanted whitening effect which is inversely correlated to their size. To overcome this effect, diameter has been reduced over the years to nanosize, increasing the surface area and biological reactivity thus carrying questions, amplified by fake news and social media, about the safety towards human and environment. Following a “safe and sustainability by design” approach we designed a new class of optimized sunscreen UV filters by chemical functionalization of ZnO and TiO₂ with polyphenols, both natural and synthetic (i.e. Oxisol, Ellagic Acid and Ferulic Acid), macromolecules and fermentation/extract products in the aim to reduce side effects of nano UV filters. If compared with the simple physical mixture, the new coated filters show different properties and benefits: a higher SPF (ISO 24443:2012), a better cytotoxic profile (MTT and NRU assay), a radical scavenging action (PCL assay) and an improved safety profile with a strong reduction of photocatalytic activity (Acid blue 9 test). In conclusion, our Sbd approach represent a new generation of UV filters bonded with booster molecules (by means of synergistic effects) as the best compromise in the conscientious UV protection and respect of the environment.

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