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Cerium phosphate used as an UV absorbent

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Ozone acts as a protective sunscreen that shields us from the high levels of UV radiation coming from the sun. However, at ground level, ozone is considered a major air pollutant. It is formed by photochemical reactions in the presence of precursor pollutants such as NO_x and volatile organic compounds. In the vicinity of strong NO_x emission sources, where there is an abundance of NO, O_3 is “scavenged” and as a result its concentrations are often low in busy urban centers and higher in suburban and adjacent rural areas. On the other hand, O_3 is also subject to long-range atmospheric transport and is therefore considered as a trans-boundary problem. Exposure to UV rays is the main factor influencing the development of skin cancers. So we have to protect ourselves from being hurt of UV.

Because of the low refractive indices, plate-like cerium phosphates (CePs) are expected to be used as cosmetics to absorb UV rays. Various CePs such as CeP_2O_7 , CeP_3O_9 , $\text{Ce}(\text{HPO}_4)_2 \cdot 2\text{H}_2\text{O}$, $\text{Ce}(\text{HPO}_4)_2 \cdot 0.33\text{H}_2\text{O}$, $\text{Ce}_2(\text{PO}_4)_2\text{HPO}_4 \cdot \text{H}_2\text{O}$, $\text{CeP}_5\text{O}_{14}$, and CePO_4 , etc., were obtained by the solvothermal reaction of Ce^{4+} and H_3PO_4 , where the morphology and color of the products changed significantly depending on the reagent concentration, temperature and time. The flower-like, fibrous, polyhedron, plate-like, rod-like, and lath-like powders with dark green, dark yellow, bright yellow, light yellow green, light yellow, and white colors were synthesized. It is seen that $\text{Ce}_2(\text{PO}_4)_2\text{HPO}_4 \cdot \text{H}_2\text{O}$ always shows a plate-like morphology. The shape and size of CePs depended on the starting materials and experimental conditions. Especially, the concentrations of Ce^{4+} and H_3PO_4 were the important factors for controlling the morphology of the particles. And the modification of the color seems to be related with the phase composition, morphology and the valence of cerium.