

## Natural Photocatalyst: Real Alternatives to the Synthesized Ones?

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Photocatalytic materials, and generally semiconductors are widely spread in different application areas, including electronics, water cleaning, sensing applications and so much more. Human, financial and natural resources are intensively invested in the synthesis of novel semiconductor materials with special properties, which may be exploited in specific research fields. This is valid also for photocatalysis, as daily new materials, composites are being reported to have photocatalytic activity, therefore the research community invests increasing amount of resources in it. However, a major issue is mostly ignored when considering photocatalysts, that some of the natural materials (e.g. minerals) possess already photocatalytic activity which the research field ignores completely.

To gain knowledge in the field of photocatalytic minerals several photoactive minerals were acquired or collected in-situ, including rutile (TiO<sub>2</sub>), ilmenite (FeTiO<sub>3</sub>) and cuprite (Cu<sub>2</sub>O) and wet media milling was applied to obtain nanoparticles. It was found that these materials show photocatalytic activity and, in some cases, advance adsorption properties as well, which is lower than that of the synthesized powders, but in terms of price/efficiency ratio and target applications (removal of low concentration of organic pollutants) it was extremely efficient. Moreover, the photocatalytic activity was correlated with the presence of different doping species and accompanying minerals. The ecotoxicological investigations of these materials carried out on *Formica Polictena* and *Formica Pratensis* showed, that in most of the cases the synthesized nanoparticles' effect were more pronounced on the mortality and behavior of the insects, than that of the natural minerals.

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