



## Hybrid organic-inorganic nanocomposites synthesized by laser techniques for environmental applications

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Photocatalytic technologies have received increasing attention owing to their versatility in addressing critical environmental and energy related challenges, through conversion of solar energy in added value chemical products, generation of clean fuels, and degradation of organic pollutants [1]. In particular, the presence of organic compounds and pathogenic microorganisms such as bacteria, virus, and fungi in water resources is a major water quality concern, being the cause of many diseases and epidemic outbreaks. Water disinfection based on photocatalytic disintegration of microorganisms is emerging as a promising alternative approach to conventional water treatment technologies [2]. However, the low activity of the photocatalysts limits their practical applications. Engineering the photocatalyst materials, aiming the extension of their optical absorption range to the visible spectral region and effective separation of photoinduced charge carriers avoiding fast recombination stand among the strategies to improve the efficiency of the photocatalytic process. Anion and cation doping of traditional transition metal oxide catalysts, and their coupling with carbonaceous materials, graphene, graphene-like reduced graphene oxide, and carbon nanotubes, can lead to improved photocatalytic activity [3, 4]. Nanocomposite layers with photocatalytic properties, consisting of cation doped semiconductor transition metal oxide nanoparticles and carbon based nanomaterials, graphene-like reduced graphene oxide were prepared by matrix assisted pulsed laser evaporation. The photocatalytic decomposition efficiency of the nanocomposite layers was investigated against microorganisms' cells constituents under UV, visible, and simulated solar light irradiation.

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