

# Biomedical applications of graphene and new 2D-nanomaterials

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Photothermal therapy (PTT) using 2D nanomaterials (2DnMat) has recently emerged as a promising alternative treatment for cancer, a major global health challenge. High surface area, high extinction coefficient in near infra-red region, responsiveness to external stimuli like magnetic fields, and the endless possibilities of



surface functionalization, make 2DnMat ideal platforms for PTT. Most of these materials are biocompatible with mammalian cells, however, each material must be comprehensively characterized physiochemically and biologically, since small variations can have significant biological impact. Highly efficient and selective PTT for the treatment of cancer has already been achieved, using different 2DnMat concentrations and incubation times. Despite the promising results, some challenges remain, such as improving 2DnMat conjugation with drugs, understanding their biodegradation, and refining the evaluation criteria to measure PTT effects. A general perspective on the work of our team will be presented, focusing on applications of 2DnMat, with emphasis on graphene-based materials for phototherapy, immunotherapy, and 3D-printing for tissue regeneration [1-3].

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