

# Nanocomposites and nanomaterials

## Graphene oxide, reduced graphene oxide and their application in photocatalysis

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Graphene oxide (GO) and reduced graphene oxide (RGO) are novel types of materials used as components in preparation of composites exhibiting photocatalytic properties. Such composites are usually composed of graphene and noble metal nanoparticles, also in combination with titanium dioxide (TiO<sub>2</sub>) [1-2]. GO and RGO differ by the amount of oxygen containing functional groups localized on the surface of their flakes. It is thought, that these groups are the active sites for nucleation and growth of nanoparticles [2-3]. It was found, that the spontaneous growth of silver nanoparticles (AgNPs) on graphene flakes can be controlled by the type and amount of oxygen containing groups [3].

In this work we demonstrate, that the type of graphene determine the growth of AgNPs on the surface of its flakes. Furthermore, the photocatalytic-assisted growth of AgNPs on graphene - TiO<sub>2</sub> composites was also examined. GO or RGO flakes were deposited on TiO<sub>2</sub> substrate resulting in partially decorated surface. It was found, that the growth of AgNPs runs in different ways on GO and RGO surfaces. Moreover, graphene flakes affect considerably the AgNPs growth on the undecorated areas of TiO<sub>2</sub>. The photocatalytic activity measurements of obtained AgNPs-GO-TiO<sub>2</sub> and AgNPs-RGO-TiO<sub>2</sub> nanocomposites revealed that the number and size of AgNPs, as well as the type of graphene, play essential role in the improvement of the photocatalytic performance of resulted nanocomposites.

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