Optical and gas sensors based on laser reduced graphene oxide

Stanislav EVLASHIN, Skolkovo Institute of Science and Technology, Russia

Abstract: Reduced graphene oxide becomes one of the most popular materials for applications in various optical, electronic and sensor devices. Even though many methods have been already reported for reduced graphene oxide synthesis, they usually rise issues related to their efficiency, quality and environmental impact. This work demonstrates a simple, environmentally friendly and effective method for reducing graphene oxide under ambient conditions using nanosecond infrared laser irradiation. As a result, a Raman band intensity ratio of I(G)/I(D) of 4.59 was achieved with an average crystallite size of ~90 nm. This graphene is of higher quality than what can be achieved with most of the existing methods. Additionally, the demonstrated reduction technique allows the selective reduction of graphene oxide and control the amount of functional groups on the surface of the material. Gas sensors and bolometers fabricated according to the proposed technique. The gas detector efficiently detect of NO2, NH3 , and H2S with the sensitivity down to 10 ppm.