

## **Microwave assisted synthesis of new nanomaterials**

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### **Abstract**

Microwave (MW) assisted synthesis have attracted recently much interest of the research community working with synthesis of new materials, in particular with carbon nanomaterials such as nanotubes, graphene, graphene quantum dots and hybrid nanomaterials [1,2]. The MW irradiation is used for fast and selective heating of processed material inducing a number of chemical reactions and structural transformations. The MW methods are based on contactless heat transfer to the reactants through molecular interactions with the electromagnetic field. This opens the possibility to induce reactions locally in a very short time with enhanced selectivity, higher yield and efficiency compared with conventional heating methods. As the energy is delivered directly to the reactants in a molecular level and within short time scale, this opens new ways for very efficient and selective synthesis of new nanomaterials and various hybrids. In summary, this is an inexpensive, fast, clean, versatile and energy saving technique with numerous possible applications. Some examples of synthesis of novel nanomaterials using MW method will be presented, as well as their applications in novel sensors, supercapacitors, lithium batteries, electron field emission, EMI shielding, among others.

[1] R Kumar, RK Singh, A Vaz, R Savu, S Moshkalev, Self-assembled and one-step synthesis of interconnected 3D network of Fe<sub>3</sub>O<sub>4</sub>/reduced graphene oxide nanosheets hybrid for high-performance supercapacitor electrode. *ACS Appl. Mater. Inter.*, 9 8880-8890, 2017.

[2] RK Singh, R Kumar, DP Singh, R Savu, S Moshkalev. Progress in microwave-assisted synthesis of quantum dots (graphene/carbon/semiconducting) for bioapplications: a review. *Materials Today Chemistry*, 12, 282-314, 2019.