Fabrication of Reduced Graphene Oxide Supercapacitor Electrodes Through Easily-scalable Laser-method

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The outstanding properties of graphene based materials have focused great interest in the recent years. Their high intrinsic electric conductance, high specific surface area, good flexibility, fast charge-discharge rate, cycling stability and long lifetime make these materials suitable for energy storage applications, for instance, in supercapacitor devices [1-3].
An easily-scalable to industry laser-method for the reduction of graphene oxide (GO) and production of surface layers consisting of graphene-like materials is presented. A highly insulating GO layer is deposited by drop-casting onto flexible substrates and is irradiated with visible laser radiation, in order to induce its chemical reduction, leading to the formation of conducting graphene-like compounds [4]. The developed laser-based method has many advantages including fast prototyping and high throughput due to the reduced number of technical steps, environmental friendliness, and high precision [5]. This technique also allows for the compositional modification of the initial layers constituted by various compounds. Particularly, the laser irradiation of GO and transition metal oxide (TMO) precursors, TMO acetates, provokes the crystallization of TMO nanostructures on the reduced graphene oxide (rGO) sheets' surface, adding pseudocapacitance to the capacitive rGO structure [6]. The resulting rGO-TMO layers show improved supercapacitive energy storage performances, investigated by means of different electrochemical techniques.

References

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Figures

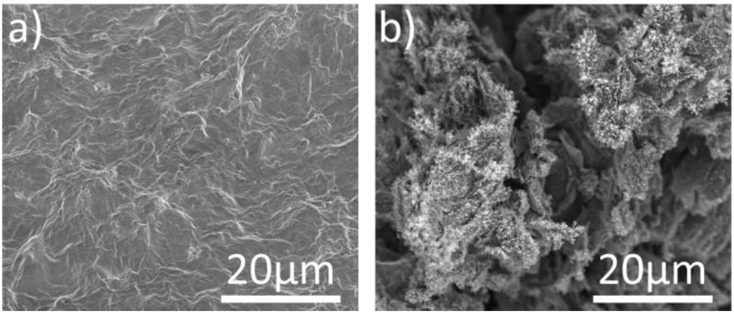

Figure 1: GO as-deposited (a) and after laser-method reduction (b).