

## Flexible graphene oxide electrodes by laser radiation

The CSIC and the Babes-Bolyai University have developed a method for the manufacture of low-cost flexible electrodes obtained from laser processing of graphene oxide (GO) films. Planar electrodes with low electrical resistance and high capacitance per unit area can be obtained, ideal for applications in electrochemical sensors and energy storage (supercapacitors).

Industrial partners are being sought to collaborate through a patent licence agreement.

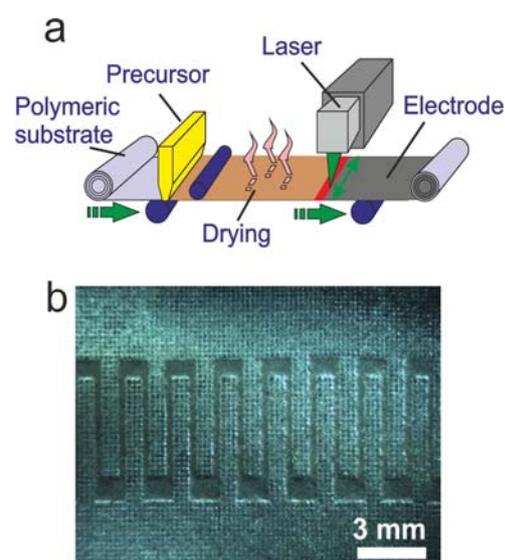
### An offer for Patent Licensing

#### High electrochemical response and great stability

Graphene-based materials present extraordinary electrical, mechanical and thermal properties, which make them special for applications in flexible electronics and electrochemical devices. The graphene oxide (GO) with its subsequent reduction (rGO) is the most used because of its lower cost and greater dispersion capacity. However, the re-oxidation and pyrolysis of the rGO when exposed to high temperatures is a drawback when manufacturing stable electrodes.

The present method is an alternative technique for obtaining a stable rGO by laser radiation. The treatment consists of irradiating with visible light a GO membrane deposited on a flexible polymeric support, protected on both sides with sheets transparent to visible light. Their function is to eliminate the oxygen reabsorption and to avoid the re-oxidation and pyrolysis of the rGO. After the process, the irradiated zone becomes rGO, while the non-irradiated zone remains intact as GO. This enables the design of electrodes with different patterns (see figures (a) and (b)).

The conditions of the treatment considerably reduce the resistance of the material and increase its electrochemical response (capacitance values of 120 mF / cm<sup>2</sup>). In addition, the rGO obtained has great mechanical stability and adhesion to the substrate.



(a) Operation scheme of the method, (b) optical microscopy image of an interdigital microsupercapacitor.

#### Main innovations and advantages

- Simple and low cost production.
- Easily scalable method.
- Ecological process, absence of toxic compounds.
- Use of low power laser (visible light).
- Procedure at room temperature: possibility of using temperature-sensitive polymers as substrate.
- Application in many fields: energy (supercapacitors, portable electronics, photovoltaic devices), sensors (chemical and biological sensors) and catalysis.

#### Patent Status

Priority patent application filed suitable for international extension

#### For more information, please contact:

Virginia Cousté

Parc de Recerca UAB (CSIC-IRTA-UAB)

Tel.: + 34 935868831

E-mail: [virginia.couste@uab.cat](mailto:virginia.couste@uab.cat)