
Laser Scribing of Graphene Oxide Yielding Multipurpose Stamped Nano Films

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r-GO can be used as conductive material for flexible electronics, since it holds many of the properties of pristine graphene while being less expensive and easier to produce. Integrating a conductive rGO film pattern in a suitable substrate allows the design of circuits for different applications. We developed a new method for the patterning and transfer of conductive rGO films onto almost any substrate (PET, paper, nitrocellulose, glass, fabric, silicon, skin, etc.). Thanks to high-resolution laser annealing and solvent-free transfer, we could fabricate isolated rGO films up to 30 nm thick with a conductivity of 10^2 S/m in three-step process: filtering of the graphene oxide (GO) solution through a nitrocellulose membrane, laser reduction of the GO film for pattern designing, and transfer of the resulting rGO pattern to a new substrate by a pressure-based mechanism. This technique was tested for sensing and biosensing applications, as back electrodes for electroluminescent lamps and touch sensors, where it proved to offer better performance compared to other commonly used materials. In addition, as it is a patterning process, the substrate is not affected by solvents or temperature, which increases its usefulness. [1]

References

[1]Giacomelli, C., Álvarez-Diduk, R., Testolin, A., Merkoçi, A, 2D Materials, (2020), doi.org/10.1088/2053-1583/ab68a7

Figures

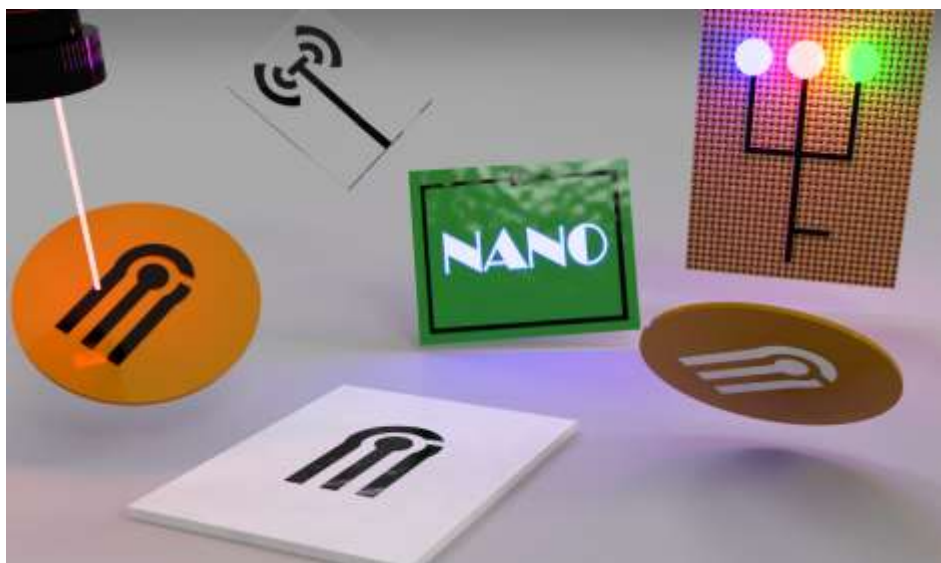


Figure 1. Schematic representation of the technique and developed devices. Laser scribed rGO is transferred onto a substrate leaving the remains of GO in the membrane. Examples of the stamping process onto different materials (A) Paper based electrode, (B) Electroluminescent lamp, (C) Proximity and touch sensor on PET, (D) 3D circuits on fabric.