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Laser-induced forward transfer of hybrid carbon nanostructures

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Highlights

- Rapid prototyping of carbon nanowalls (CNW) and functionalized CNWs is described
- CNW and CNW:SnO₂ pixels are successfully printed by laser-induced forward transfer
- Flexible (polyimide) and rigid (glass) supports are used as substrates
- 4 μm thick CNW and CNW:SnO₂ pixels maintain their morphology and structure after LIFT

Abstract

Chemically functionalized carbon nanowalls (CNWs) are promising materials for a wide range of applications, i.e. gas sensors, membranes for fuel cells, or as supports for catalysts. However, the difficulty of manipulation of these materials hinders their integration into devices. In this manuscript a procedure for rapid prototyping of CNWs and functionalized CNWs (i.e. decorated with SnO₂ nanoparticles) is described. This procedure enables the use of laser-induced forward transfer (LIFT) as a powerful technique for printing CNWs and CNW:SnO₂ pixels onto rigid and flexible substrates. A morphological study shows that for a large range of laser fluences i.e. 500-700 mJ/cm² it is possible to transfer thick (4 μm) CNW and CNW:SnO₂ pixels. Micro-Raman investigation of the transferred pixels reveals that the chemical composition of the CNWs and functionalized CNWs does not change

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