

Graphene Gas Sensor

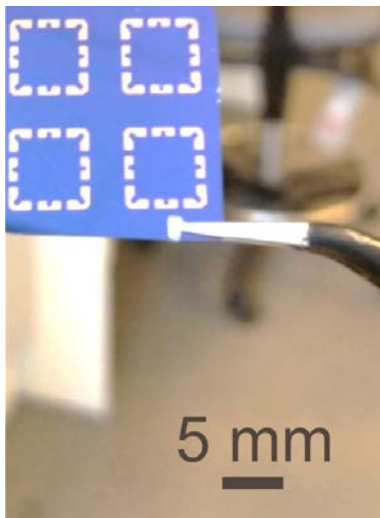
Graphene based gas sensors have received great interest in the past five years, showing down to single molecular detection. Recent studies have shown that patterning of graphene strongly increases the sensitivity compared to non-patterned layers.

CVD graphene was grown by standard procedures and then transferred to Si/SiO₂ substrates for further processing. Contacts and devices areas were defined using physical shadow masks and laser ablation as described in (Mackenzie, **2D Materials**, [<http://dx.doi.org/10.1088/2053-1583/2/4/045003>]).

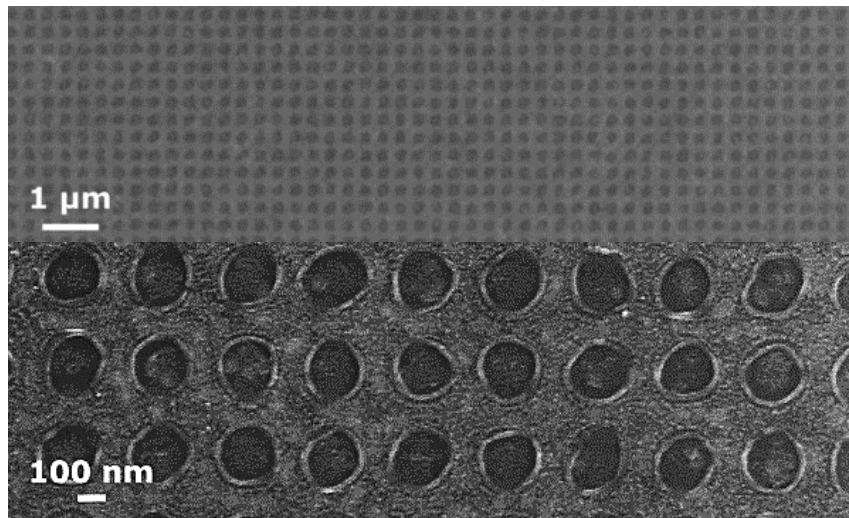
Thermal nanoimprint lithography was performed in CNI v2.0 using a soft stamp. mr-I7010E imprint resist was imprinted at 130 °C, 6 bar pressure for ten minutes. The pressure was released at 70 °C.

Large area patterns of holes with an edge-to-edge spacing of 120-150 nm were transferred into the graphene by reactive ion etching, and remaining resist was removed with acetone.

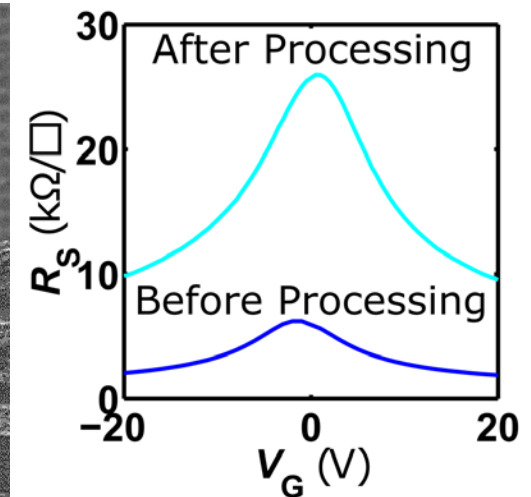
Devices were found to have a carrier mobility of approximately 2000 cm²/Vs before processing, and 400 cm²/Vs after processing, while maintaining the overall low doping level.



Si/SiO₂ substrate with graphene and gold contacts



SEM images of graphene layer after NIL structuring



Sheet resistance measurement before and after NIL structuring

Compact Nanoimprint – CNI v2.1

Desktop nanoimprint tool

Easy replication of micro- and nanoscale structures

