Direct Synthesis of Laser Induced Graphene Electrodes on a Quartz Crystal Microresonator Sensor

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We have synthesized a laser induced graphene (LIG) layer directly on a quartz crystal microresonator using a CO_2 laser engraver and measured changes in mass and electrical resistance of the LIG simultaneously during gas adsorption. A thin layer of polyimide (PI) film was spin-coated on one side of a quartz crystal microresonator and interdigitated electrodes were patterned on the PI surface using a laser engraver. The adsorption of moisture on the sensing surface induced changes in mass and electrical conductivity, which were measured from the changes in the resonance frequency of the quartz crystal and the electrical resistance of the LIG electrode, respectively. It was found that the adsorption of different gases produced characteristic changes in the resonance frequency and electrical resistance.