

## Carbon dots assisted doping on Graphene to improve charge transfer in graphene/n-Si Schottky Solar cell

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Graphene doping with various dopants is a way to tailor the electronic properties of graphene to meet the desired requirements for a particular application. Here we report carbon dot doping on a graphene grown directly on silicon substrate using microwave plasma chemical vapor deposition. Carbon dots doping is found to enhance the sheet charge carrier mobility of graphene. Sheet carrier mobility was measured using Hall effect measurement.

Doping ingredient Carbon dots were synthesized using citric acid as precursor by decomposition method. The synthesized solution was subjected to purification by syringe filtration. The solution was illuminated by UV light to observe its output light emission as a preliminary confirmation of Carbon dots. Further, the same solution was spin coated and dried on glass for Raman and AFM analyses of carbon dots.

After interaction of carbon dots with graphene in the presence of Laser irradiation, Raman spectrum shows a shift in G and D peaks, thus confirming doping on graphene samples. Carbon dots doping also shows an improvement in charge transfer, enhancing higher sheet carrier current density in Ag/CarbonDots-Graphene/n-Si/n<sup>+</sup>/Al solar cell.

Table: Effect of carbon dots doping on graphene properties

	Before doping	After doping
<b>Mobility (cm<sup>2</sup>/vs)</b>	10.35	925.62
<b>Sheet carrier conc. (/cm<sup>2</sup>)</b>	104 x 10 <sup>13</sup>	2.7 x 10 <sup>13</sup>
<b>Sheet Resistance (Ω/□)</b>	580	250
<b>Voc (mV)</b>	180	205
<b>Isc (μA)</b>	120	200