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**Supporting Information**

# A Soluble Fluorene-Benzothiadazole Polymer Grafting Graphene for Photovoltaic Device

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Power Conversion Efficiency Measurement:
The solar cell were measured inside Ar filled chamber that was pumped down to $1e^{-7}$ Torr. The shadow mask confined the device area of around 0.24 $cm^2$ for cathode deposition. The same mask is used during device measurement to avoid edge effect for
small area solar cell. Current-Voltage sweeps were done under simulated air mass 1.5 irradiation (80 $mW/cm^2$) using a xenon-lamp-based solar simulator (CHI660C).

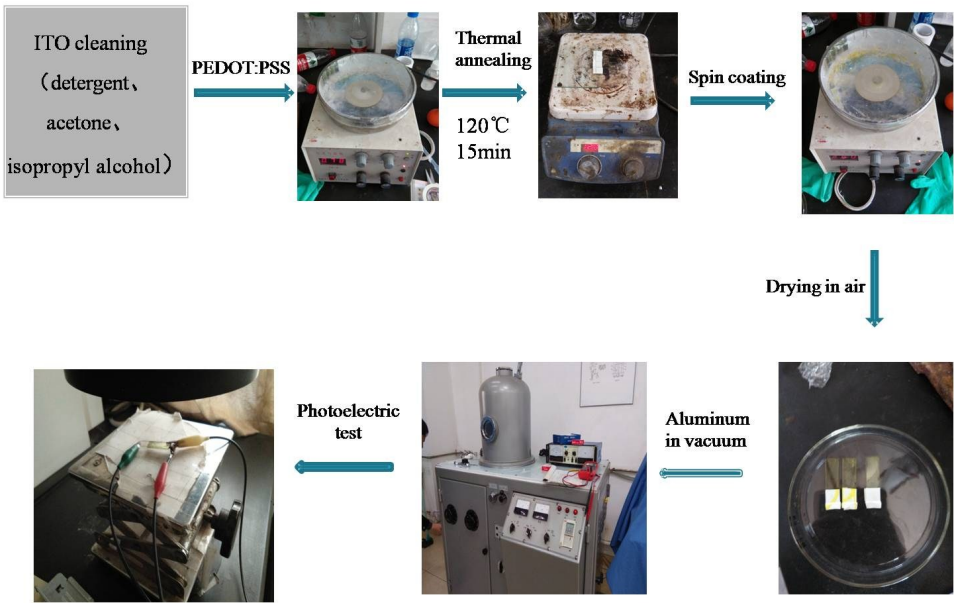


Figure1.The manufactured procedure of polymer solar cells.

The parameters of photoelectric test:

Instrument Model: CHI660C

Init E (V) = -1.2

Final E (V) = 0.2

Scan Rate (V/s) = 0.1

Sample Interval (V) = 0.001

Quiet Time (sec) = 2

Sensitivity (A/V) = 0.01

Irradiation intensity : 80 $mW/cm^2$