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Supplementary Information

Submerged liquid plasma – Low energy synthesis of nitrogen-doped graphene for electrochemical applications

Jaganathan Senthilnathan, Kodepelly Sanjeeva Rao, Masahiro Yoshimura*
Promotion Centre for Global Materials Research (PCGMR),
Department of Material Science and Engineering,
National Cheng Kung University, Tainan, Taiwan

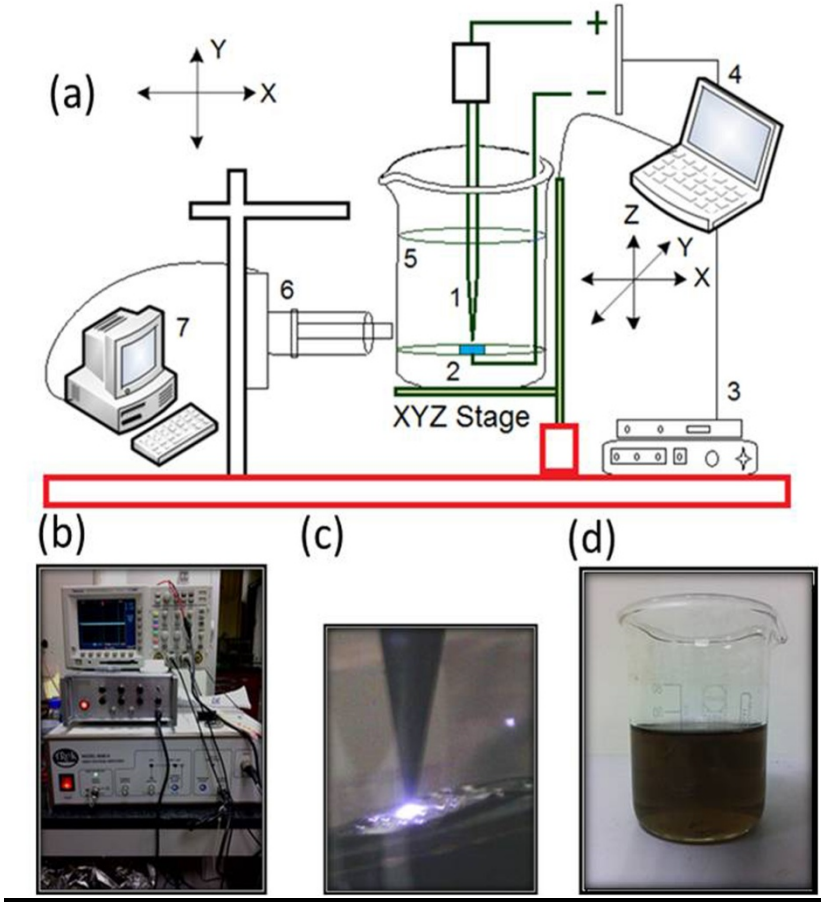

Fig. S1: (a) Block diagram of SLP (1) graphite rod (2) Pt electrode (3) pulse generator connected to high-voltage amplifier (4) three stage assemble control (5) acetonitrile solvent (6) camera (b) image of pulse generator connected to high-voltage amplifier (c) micro plasma discharge in acetonitrile solvent (d) N-FG in acetonitrile solution.

All experiments were conducted using Pt and graphite rod (99.99%) electrodes. The tip diameter of the graphite rod was maintained at 200-800 µm. Acetonitrile (99.95%) and the graphite rod (diameter: 6.15 mm;length: 152 mm) (AGKSP grade, ultra "F" purity) procured from Alfa Aesar wereused as the target materials.A discharge voltage of 2.9 kV was applied with a repetition rate of 10kHz, a pulse delay of 500µs, and a pulse width of5msacross the electrodes using a pulse generator (AVTECH AV-1022-C) connected to a high-voltage amplifier (TREK Model 609E-6),which can generate 0.1 to 5 kV. To get the maximum plasma intensity, the distance between the graphite and Pt electrodes was maintained at~75µm by using a moving stage assembly (Translation Stage Triple-Divide Series 9064 and 9065)operated by a computer. A submerged plasma reaction in acetonitrile was carried out for a fixed reaction time of 30 min.The final N-FG solution was centrifuged (8000 rpm) and the residuewas washed with acetonitrile solution several times.

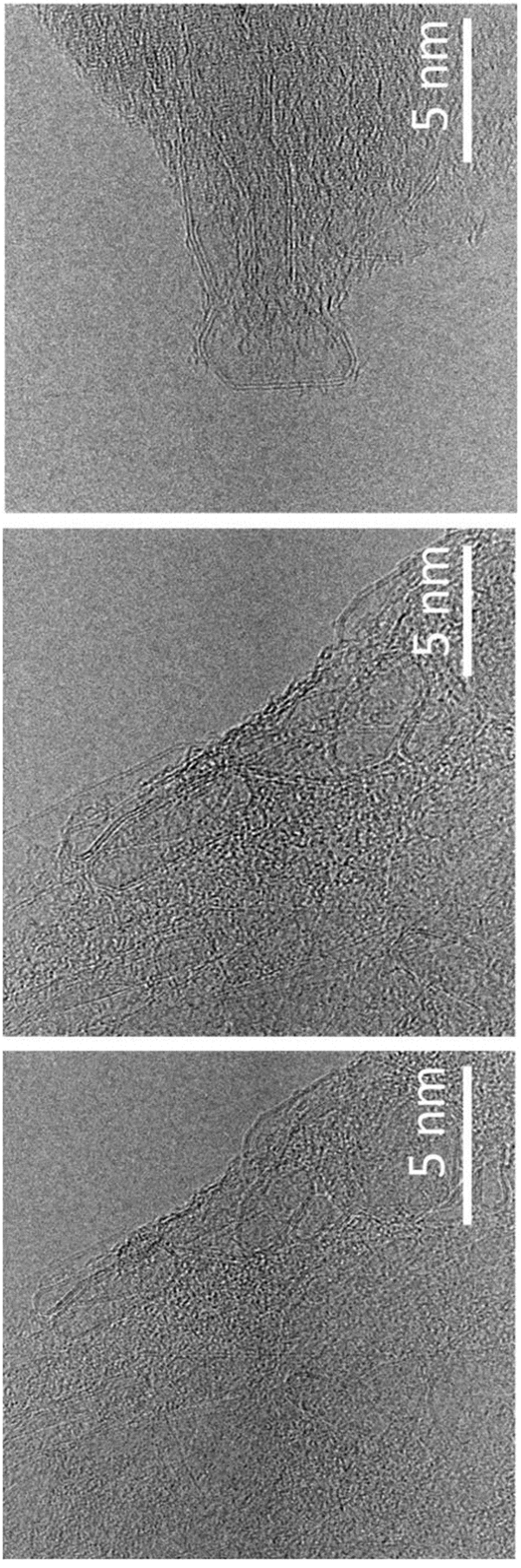

Fig.S2 TEM image of N-FG

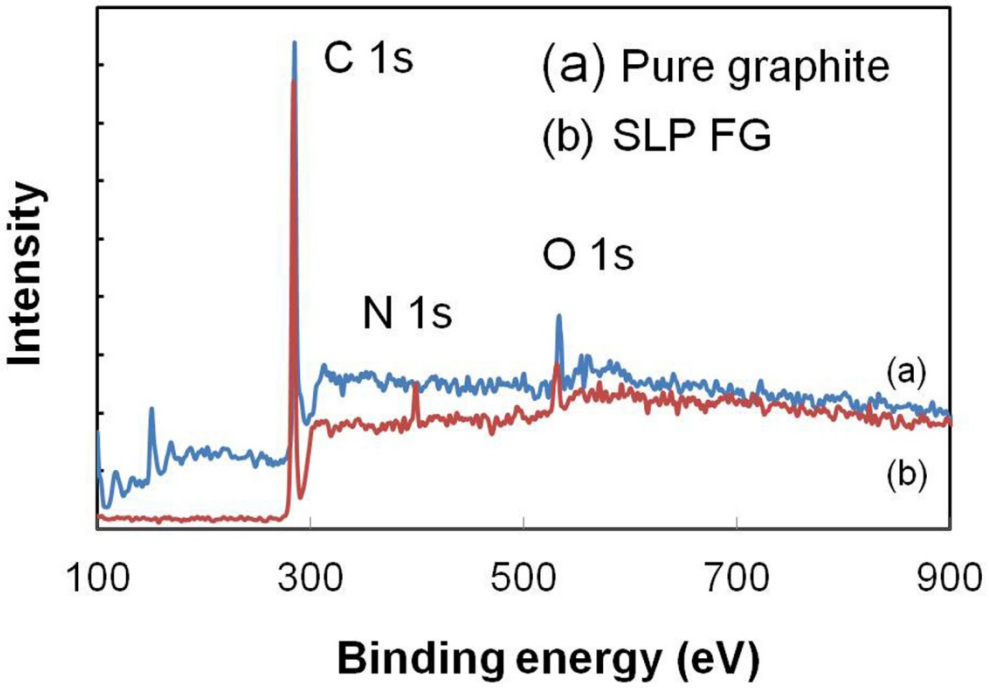

Fig.S3 XPS spectra of pure graphite rod and N-FG.