

Supporting Information

Explosive thermal reduction of graphene oxide: mechanism and safety implications

Fig.S1: Synthesis of 15-cycle drop-cast GO film. S1a) synthesis procedure, S1b) photo image of all GO films synthesized on polystyrene substrate, S1c) photo images of 3-cycle, 9-cycle and 12-cycle drop-cast GO films. Note as thickness increases, the GO film gets less transparent.

Fig.S2: Images of DSC cell and TGA sample pan before and after micro-explosions.

S2a) DSC cell image before explosion, S2b) DSC cell image after explosion. Initially approximately 2 mg of GO cake was placed into aluminum hermetic sample pan. Note, after micro-explosion the sample pan is torn into two parts - the lid and the bottom parts, and reference pan in DSC cell is misplaced. Black colored fine GO cake powder covers most of the cell. Fig. S2c) and S2d): TGA sample pan images before and after explosion with 3.6 mg GO cake.

Fig.S3: 15-cycle drop-cast GO film and 15-cycle drop-cast rGO film FTIR results. GO film has wide hydroxyl peak range ($2900-3600\text{ cm}^{-1}$), together with epoxides (962 cm^{-1}), ethers (1035 cm^{-1}) and carboxyls (1724 cm^{-1}). The 1619 cm^{-1} peak is related to vibrations of the unmodified graphenic domains within GO. During thermal exfoliation in inert N_2 most of the oxides are removed when heated to 250°C .

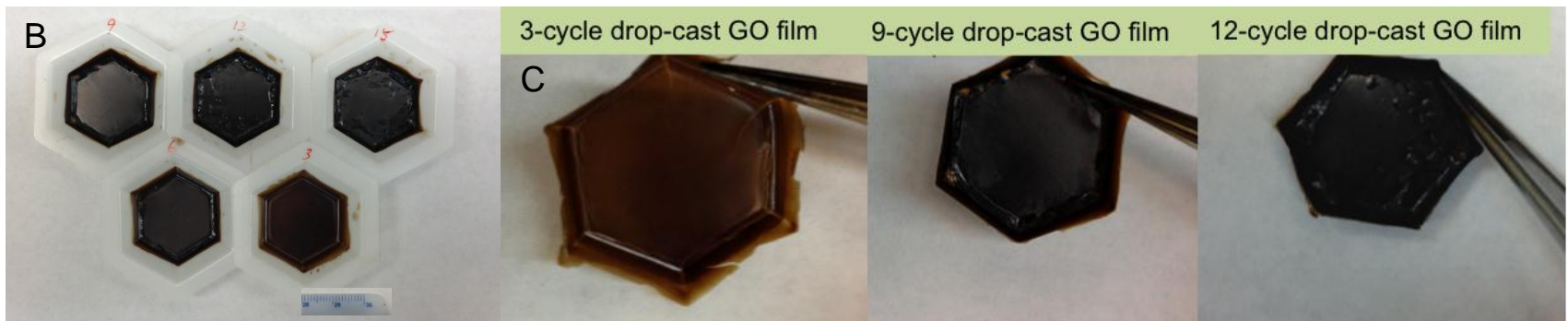
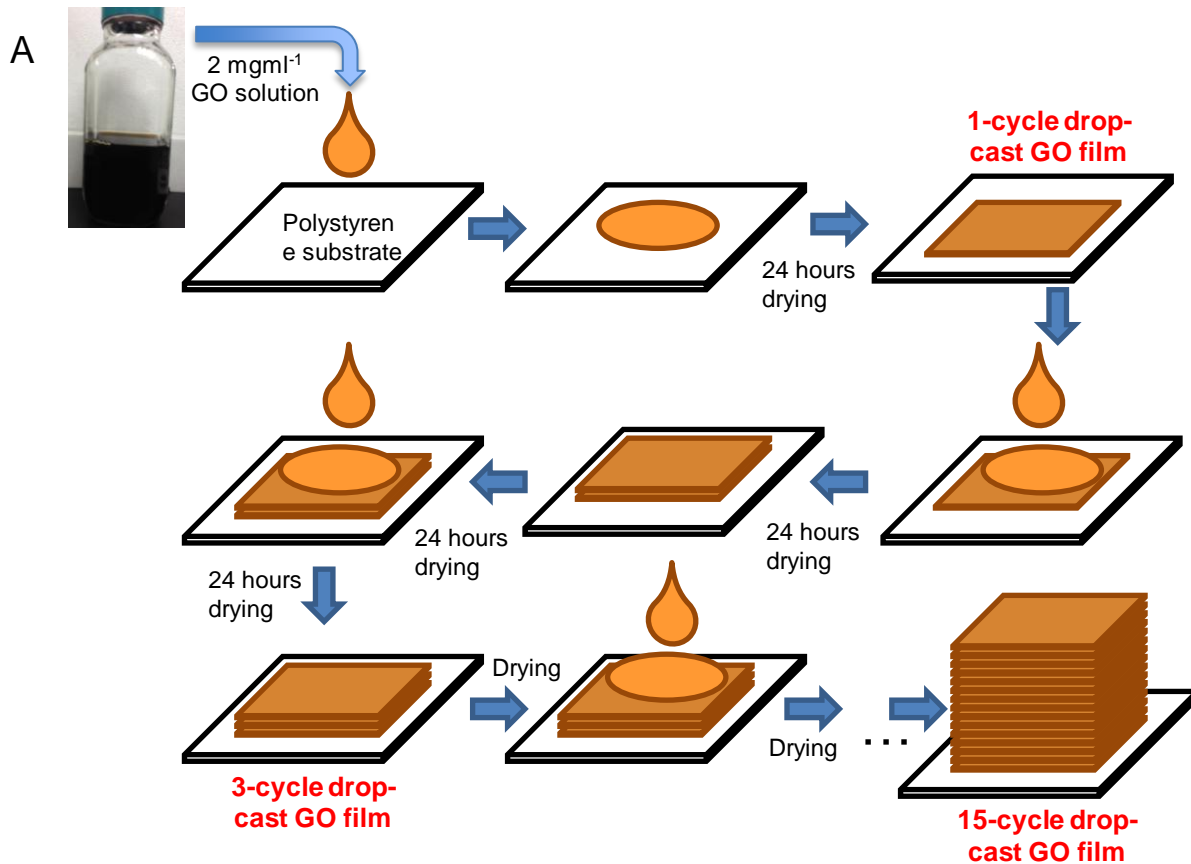


Fig. S1: Synthesis of 15-cycle drop-cast GO film. S1a) synthesis procedure, S1b) photo image of all GO films synthesized on polystyrene substrate, S1c) photo images of 3-cycle, 9-cycle and 12-cycle drop-cast GO films. Notice as thickness increases the GO films get less transparent.

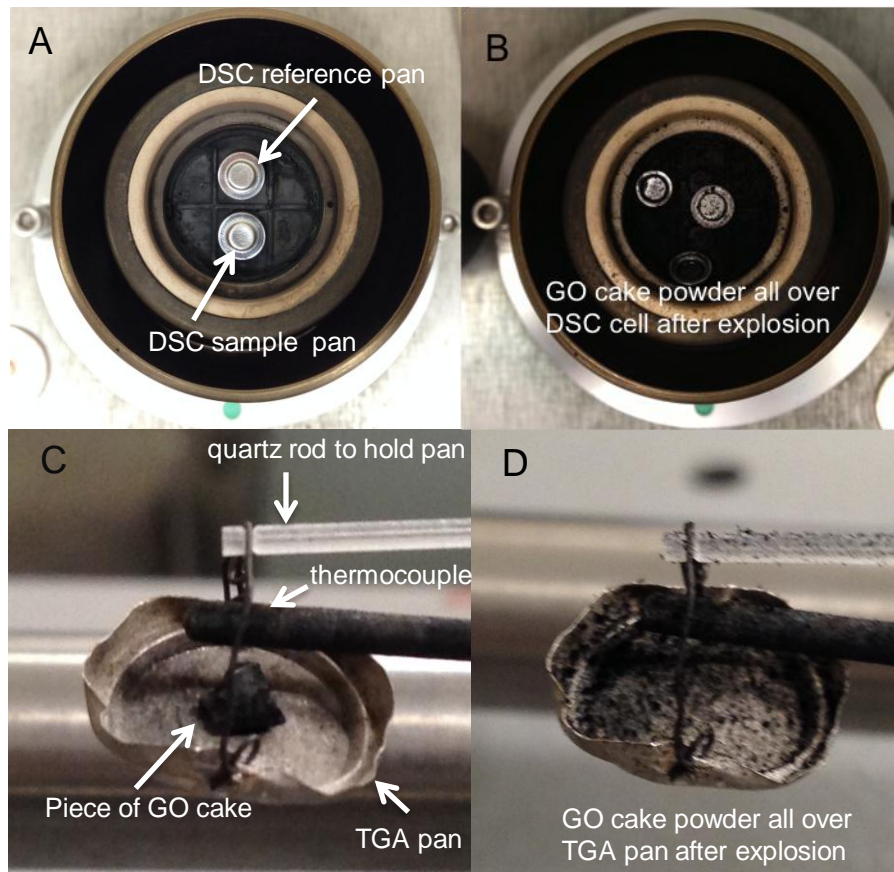


Fig. S2: Images of DSC cell and TGA with sample before and after micro-explosions. S2a) and S2b) DSC cell images before and after explosion. Aluminum hermetic sample pan had ~2 mg of GO cake sample. Note, after micro-explosion the sample pan is torn into two parts the lid and bottom part, and reference pan are misplaced. GO cake powder all over the cell. Fig. S2c) and S2d): TGA sample pan images before and after explosion with 3.6 mg GO cake mass.

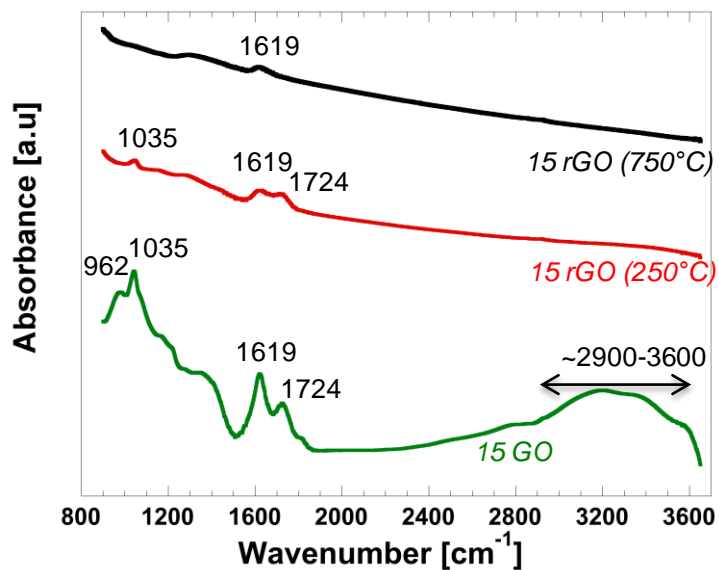


Fig. S3: 15-cycle drop-cast GO and rGO film FTIR results. GO film has wide hydroxyl peak range (2900-3600 cm^{-1}), together with epoxides (962 cm^{-1}), ethers (1035 cm^{-1}) and carboxyls (1724 cm^{-1}). The 1619 cm^{-1} peak is related to vibrations of the unmodified graphenic domain within GO. During thermal exfoliation in inert N_2 most of the oxides are removed when heated to 250°C.