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Flexible Electrode Technology Based on Chemically-Modified Graphene Nanosheets

Chemically exfoliated graphene sheets show promise for use in high performance electronics and sensor applications because they are solution processable and display unique electrical properties. The solution processability of graphene oxide (GO) permits application of GO to substrates *via* spin-coating, spray-casting, drop-casting, or inkjet printing for the large-scale production of graphene electronic circuits. Subsequent reduction of GO sheets can proceed through deoxygenation by thermal or by chemical reduction. The direct fabrication of uniform reduced GO (rGO) films is difficult because rGO sheets are not easily dispersed in solvents, and they form wrinkled structures during spin-coating, spraying, or printing. Thus, the solution processability of rGO solution is most important for its application in flexible electronics.

Here, we present how we can produce highly quality graphene oxide nanosheets and disperse in solutions for applications in flexible electrodes towarding soft electronics. Non-covalent interaction and supramolecular chemisty allowed us to disperse rGO in organic solvents. Particularly, ureido-pyrimidinone moieties introduced in graphene edge played a great role to fabricate highly conducting graphene pastes. IN addition, highly oxidized graphene oxide nanosheets were applied to enhance the optoelectrical performance of transparent conducting electrodes on plastic substrates.

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Figures

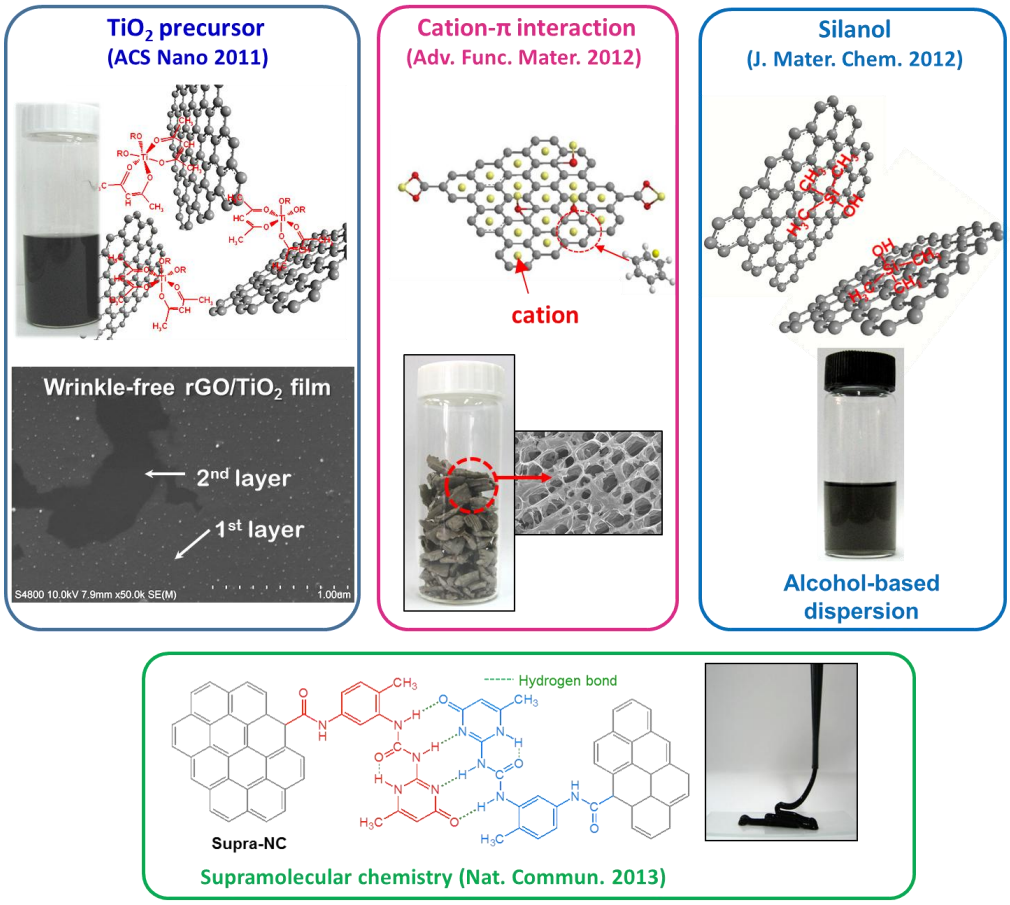

Figure 1: Proposed strategies for colloidal dispersion of reduced graphene oxide in organic solvents