Supercritical alcohol reduction and reduction mechanism of graphene oxide

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Recent intensive researches on graphene have revealed its superior properties, which are high electron conductivity, thermal conductivity, specific surface area, and good mechanical properties. Considering the massive production, supercritical alcohol reduction of graphene oxide (GO) is regarded as an environmental friendly and effective method comparing to other hydrazine reduction or thermal reduction method. The reduction degrees of supercritical alcohol reduced graphene oxide (RGO) were studied via Raman spectroscopy, X-ray diffraction patterns, X-ray photoelectron spectroscopy, and Brunauer-Emmett-Teller analysis. The dispersion tests for RGOs were performed with several well known solvents. For the studies on supercritical reduction mechanism, the remained gas and liquid phase after supercritical reduction were collected and analyzed with Karl Fischer titrator, gas chromatography-mass spectrometry, and refinery gas analyzer. Ethanol was found to be effective solvent for supercritical reduction of GO with proposed reduction mechanism involving β-hydrogen in ethanol.