# Tuning the oxygen content of reduced graphene oxide: comparing HI and NaBH4 chemical reduction processes

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Chemical exfoliation route is largely utilized to produce amounts of graphene particulate. The result of the exfoliation processes consists of highly oxidized graphene sheets in the form of micro/nano sizes easily dispersible in water. These sheets display a number of defects and a rather low conductivity mirrored by the presence of an optical gap. The need to recover the properties of pristine graphene in terms of electrical and thermal conductivity, requires the removal of oxygen atoms from the graphene oxide sheet surface by applying reduction processes. However, the reconstruction of carbon-carbon double bonds leads only to a partial recovery of the original graphene properties because of the presence of residual oxygen atoms and lattice defects. Partial loss of surface polarity due to lack of oxygen based functional groups makes the material dispersibility less complicated. In addition, presence of residual oxygen-containing functional groups is beneficial because they are reaction sites useful to further bind active molecules needed to engineer the reduced graphene sheets. In this respect, it is greatly important to thinly modulate the residual oxygen content thus tuning the properties of the final product. In this work, we will compare two chemical processing technique using hydroiodic acid and sodium borohydride to thinly control the degree of residual oxidation. This allows a careful tailoring the material properties with respect to the desired application.