# Nitrogen-doped Graphene for Supercapacitor Application with High-qualified Graphene

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## Abstract

Due to its intrinsic properties such as high surface area and high conductivity, graphene has been regarded as a promising electrode material in various fields of energy conversion and storage devices.[1,2] In supercapacitors, however, pristine graphene shows poor capacitive ability. Although various state-of-the-art modification techniques have been applied continuously in order to enhance capacitance of supercapacitors, the improvement of graphene-based electrode materials for supercapacitors still require further exploration to improve capacitive performance and stability.

The unexpected low performance of graphene is ascribed to restacking of graphene and low transferability of charge carriers.[3,4] Therefore, various synthesizing methods of reduced graphite oxide (rGO) from graphite oxide (GO) have been investigated to improve characteristics of rGO. Among them, doping of heteroatoms (e.g. N, B, P, S and etc.) regarded to improve capacitive performance of graphene-based electrode materials by providing efficient adsorption/desorption sites for charge carriers on the graphene surface.[5-8]

In this study, N-doped rGO (nrGO) and ball-milled N-doped rGO (nbrGO) electrode materials which are modified from well-defined rGO are prepared. Then, their capacitive behaviors and the origin of the performance are investigated *via* cyclic voltammetry (CV), galvanostatic charge/discharge, and electrochemical impedance spectroscopy (EIS) methods in a symmetric unit cell.

## References

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## Figures

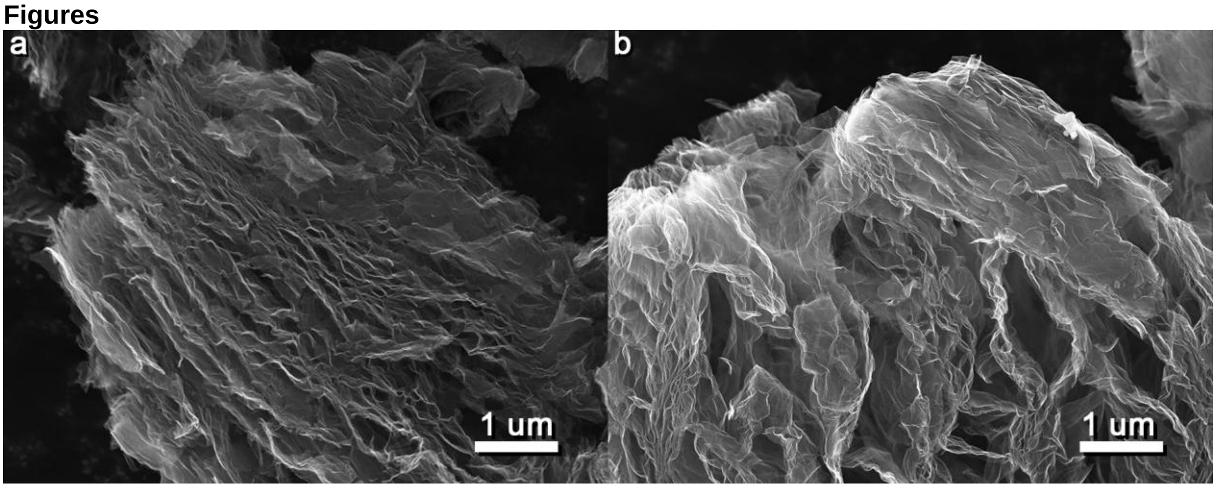

**Fig.** SEM images of (a) rGO-1 and (b) rGO-2 electrode materials obtained at a 10 kV electron acceleration voltage. These well-defined rGO samples are used to synthesize N-doped rGO materials.