

## Loop formation of edge sites in vapor grown carbon nanofiber

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In the electrochemical energy storage field, carbon nanomaterials including carbon nanotubes, graphene and graphitic nanoribbons have gained attraction owing to their high chemical stability and excellent electronic properties. Carbon nanomaterials have two different structural parts ; (a) the basal plane, forming homogeneous honeycomb lattices and (b) the edge site, consisting of oxygen-containing functional groups. In particular, the edge sites act as a gateway of lithium ion intercalation in the lithium ion batteries (LIBs) and thus they exhibited higher chemical properties than basal plane. To achieve stable but high electrochemical performance as the anode material of LIBs, a control and an in-depth study of the edge site should be carried out. In this work, we systematically investigated how active edge sites are structurally transformed into stable loop under high temperature thermal treatment in argon using various analytical techniques.