Vertically aligned mesoporous silica-graphene composite and their application in synthesis of nanomaterial-graphene composite

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Graphene has been widely investigated for nanomaterial composite due to outstanding mechanical and electronic properties. Graphene's fast electron mobility, high conductivity and large surface area create a synergy effects for nanomaterial and graphene. However, despite importance of morphology and size distribution of nanomaterial in electrochemistry, the precise control of properties of nanosized materials has not been widely reported yet. In our research, we explored effective synthesis method of nanomaterial-graphene composite with nanomaterial of sub-10 nm size. The hexagonally ordered porous silica structure was formed on the graphene oxide via self-assembly of the graphene, a silica precursor and a cationic surfactant. We anticipate that the mesoporous silica-graphene composite is very useful to guide the synthesis of various nanomaterials on the graphene. Also mesoporous silica-graphene or nanomaterial-graphene composite is obtained as a bulk type which is essential to utilize it in industrial level.