

Electrochemical Performance Evaluation of Galvanostatically Deposited $\text{Co}(\text{OH})_2$ on Few-Layered Graphene Electrodes

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In this paper, an electrochemical performance evaluation of galvanostatically deposited $\text{Co}(\text{OH})_2$ onto few-layered graphene (FLG) is presented. The electrochemical evaluation was carried out in a two-electrode symmetric cell arrangement. Electrodes were synthesized by combining FLG made through simple instrumentation atmospheric pressure–chemical vapor deposition (AP–CVD) process onto Cu foil substrates, and galvanostatically deposited Co by chronopotentiometry deposition. Faradaic contributions of as-deposited $\text{Co}(\text{OH})_2$ increase the areal capacity of the electrochemical cells (EC) with an areal capacity of $0.72 \mu\text{A h cm}^{-2}$, in comparison with the FLG EC with an areal capacity of $0.04 \mu\text{A h cm}^{-2}$ at 4 mA cm^{-2} . Along with the areal capacity enhancement, specific energy, as the galvanostatic charge/discharge evaluation tells, showed a boost from 0.434 to 7.79 mW h g^{-1} evaluated at 4 mA cm^{-2} , when the EC is galvanostatically deposited with Co. In terms of specific power, both EC presents similar values around 335 mW g^{-1} . These results offer some insight into the electrochemical complexation of carbonaceous supports obtained from the bottom-up synthesis approach and how they can be tuned to increase the electrochemical storage capabilities of the materials.

Keywords: AP–CVD; few-layered graphene; galvanostatically deposited $\text{Co}(\text{OH})_2$; electrochemical performance; energy storage

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