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# Lithium storage performance of copper nitride films deposited by reactive DC magnetron sputtering

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## Abstract

Copper nitride (Cu<sub>3</sub>N) films were deposited on copper foil substrates by reactive direct current (DC) unbalance magnetron sputtering. The Cu<sub>3</sub>N films with DC sputtering powers of 110, 205, 280 and 373 W under the mixture of argon (Ar) and nitrogen (N<sub>2</sub>) gases were investigated. The dependence of crystalline structure and film thickness of Cu<sub>3</sub>N on the sputtering powers was evaluated. Exclusively, the electrochemical measurements of the films in 1M LiCl as electrolyte were also carried out. The good performance of lithium ion storage was observed. These results demonstrate that Cu<sub>3</sub>N film on copper foil could be further explored as high capacity material for flexible lithium ion battery development.

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*Keywords:* Copper nitride film; Magnetron sputtering; Lithium ion storage

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## 1. Introduction

Transition metal nitride films have been focused on the various applications due to their outstanding properties such as, optical, electrical and energy storage properties [1-8]. Most of these applications have been concentrated on the lithium ion (Li-ion) batteries [9]. Copper nitride (Cu<sub>3</sub>N) film has been focused as a candidate in electrochemical applications due to their low cost, long lifetime and high stability [10-11]. This semiconducting film is a good

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