LITHIUM COBALT OXIDE DEPOSITED ON POLYIMIDE SUBSTRATE

J. F. Ribeiro[1], R. Sousa[1], L. M. Goncalves[1], M. M. Silva[2], L. Dupont[3], J. H. Correia[1]

1Algoritmi Centre, University of Minho, Guimarães, Portugal
2Chemistry Centre, University of Minho, Braga, Portugal
3LRCS – UMR 6007, University of Picardie Jules Verne, Amiens, France
jribeiro@dei.uminho.pt

Increasing demand for smaller and safety storage systems in energy harvesting modules and in electronic autonomous and portable devices is leading the research in thin-film secondary lithium batteries [1]. This technology presents safer and with more energy density than conventional lithium batteries due to all the materials be in solid state, so no leaking or explosion could occur and because the encapsulation is smaller and lighter. Batteries are composed by three main materials, the cathode, the electrolyte and the anode and all can be fabricated by PVD. Recently a demand for flexible systems is increasing the efforts to develop flexible electronics, flexible energy harvesting modules and flexible energy storage systems. These three parts that composes a full autonomous flexible microsystem are in development by many groups all around the world, but the energy storage development is still delayed, limiting the overall performance. Our work is focused in this problem with the use of Kapton® [2] as substrate in thin-film lithium secondary batteries. Kapton® is a flexible polyimide film developed by Dupont [2] and has excellent behaviour in thin-film depositions.
The cathode of thin-film lithium batteries is normally composed of lithium cobalt oxide ($LiCoO_2$) and needs to have the capacity of receive and deliver lithium ions without compromise its structure. For this, the $LiCoO_2$ needs to be crystalized in (101) direction, which provides a structure perpendicular to substrate and improves lithium cycling [3]. $LiCoO_2$ is deposited by RF sputtering and needs an annealing around 700 ºC for 1 hour to achieve good crystallinity. The Kapton® substrate can only support 400 ºC and its amorphous structure makes harder to deposit crystalline films on it. In this work, we present a comparison between $LiCoO_2$ thin-films deposited in silicon and Kapton® substrates and a solution to improve crystallinity of films in the Kapton® substrate.

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