Investigation of LiF thin film for Organic Light Emitting Diodes by Atomic Force Microscopy

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Abstract

In organic light emitting diodes, the cathode usually consists of a thin layer of LiF, approximately 1nm thick, followed by a thicker layer of aluminum. The purpose of thin LiF is to enhanced electron injection for better balance of charge carriers, leading to an increase in number of excitons in the emissive layer. This thin layer between the cathode and organic layer also leads to low operating voltage and better electroluminescence output in OLEDs. However, since the thickness of LiF is very small, optimization of this film is difficult. We have deposited a thin layer, between 0.5 to 2.0 nm, of LiF on various substrates. The film morphology was investigated by Acoustic AC mode Atomic Force Microscopy for both topography and phase imaging. Furthermore, a LiF resistor was created by sandwiching LiF film between two conductors. We then develop a method to determine the film morphology by Current Sensing Atomic Force Microscopy for the purpose of optimizing the LiF film for applications in organic light emitting diodes.