High-Vacuum Conductive-AFM Observation of an Organic Semiconductor Thin Film Solar Cell (P3HT-PEDOT)

SHEET No. 012

Instruments: Environment control AFM AFM5300E

Introduction

The advantage of high-vacuum for electric AFM measurements of materials and devices is to prevent the influences of the adsorbed water on the surface, humidity and surface oxidation. This data sheet presents the conductive-AFM observation of an organic semiconductor thin film solar cell consisting of P3HT (organic semiconductor) and PEDOT (conductive polymer) in a high-vacuum (10^{-4} Pa).

Results

Figure 1 shows the high-vacuum conductive-AFM results of an organic semiconductor thin film solar cell (P3HT-PEDOT). The AFM and current images were measured simultaneously with a DC bias of 5 mV. The electric current flows through the bright spots of the current image. Figure 2 shows the 3D overlay image of the AFM and current image and the cross-section profile analysis. The current spots are 5-10 nm in diameter, their current value is around 1-10 nA.

AFM5300E

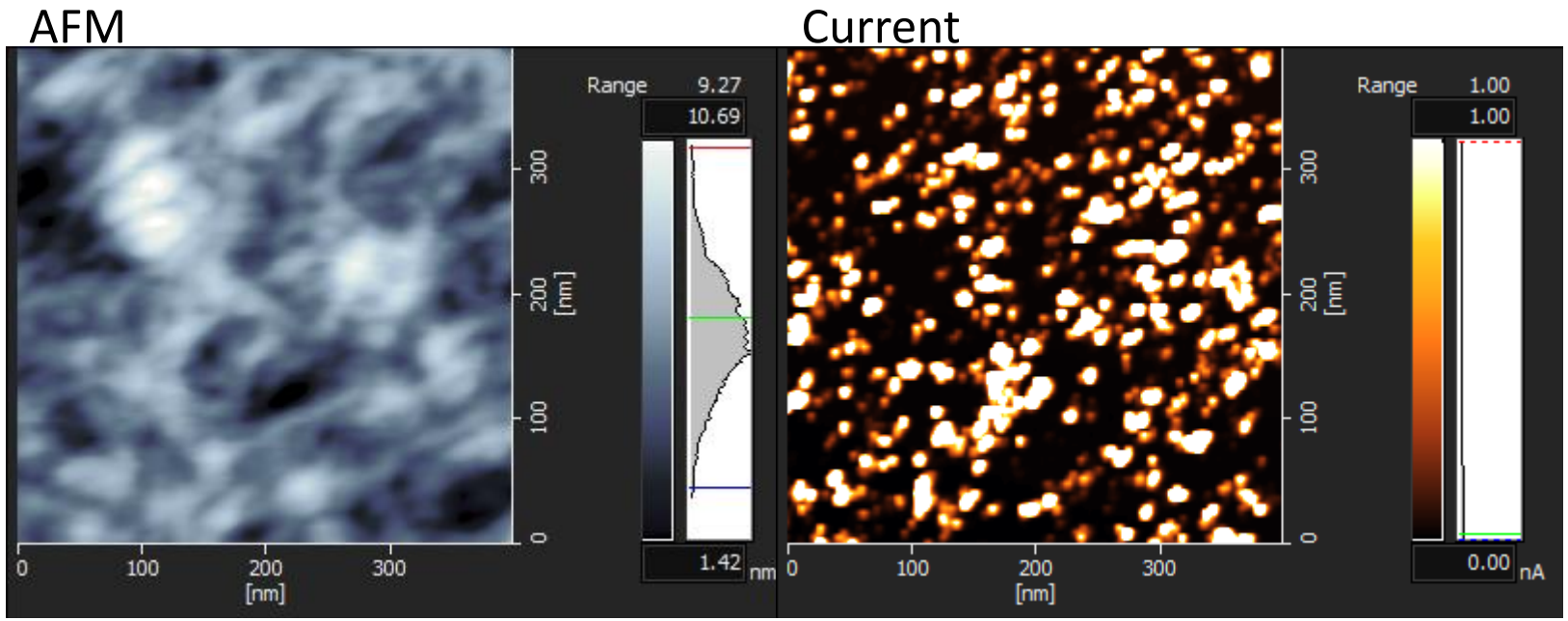
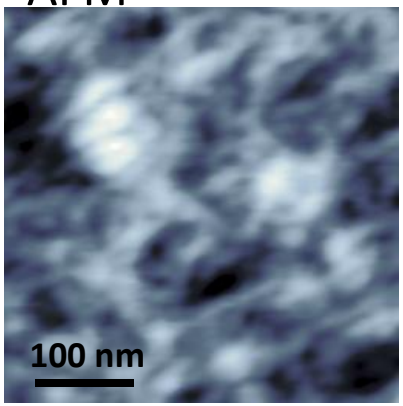
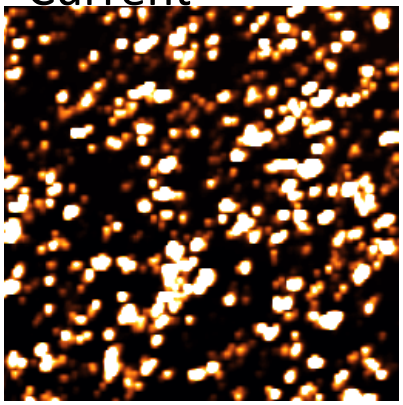


Figure 1: AFM5300E and conductive-AFM observation in a vacuum of an organic semiconductor thin film solar cell (P3HT-PEDOT)

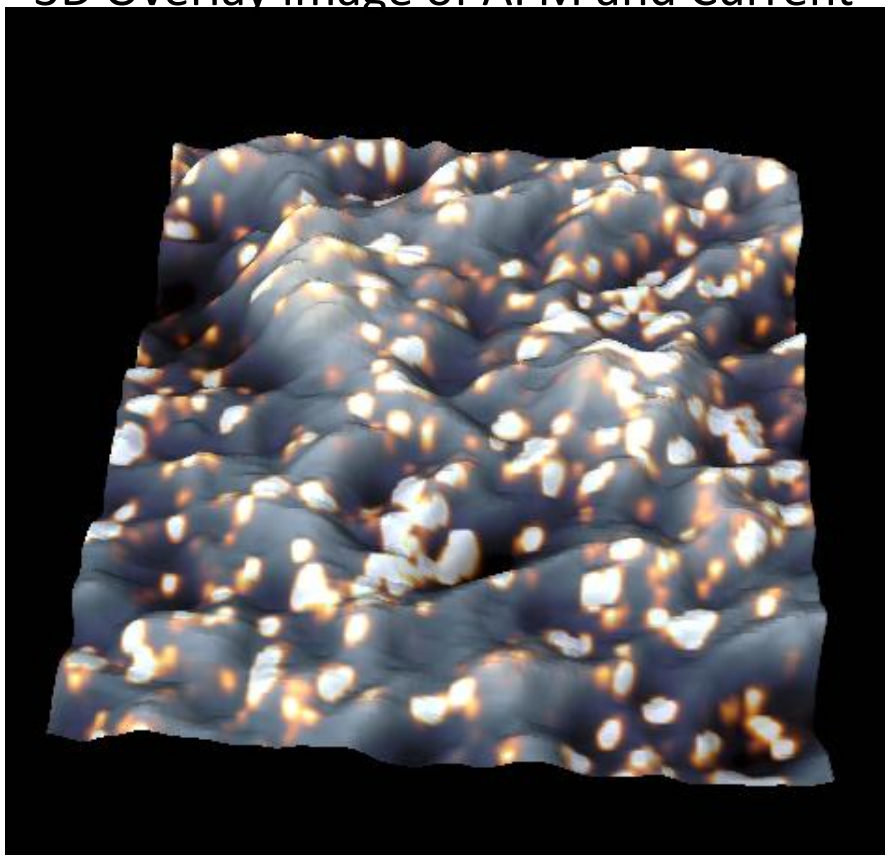
AFM



Current



3D Overlay image of AFM and Current



Cross-section profile analysis

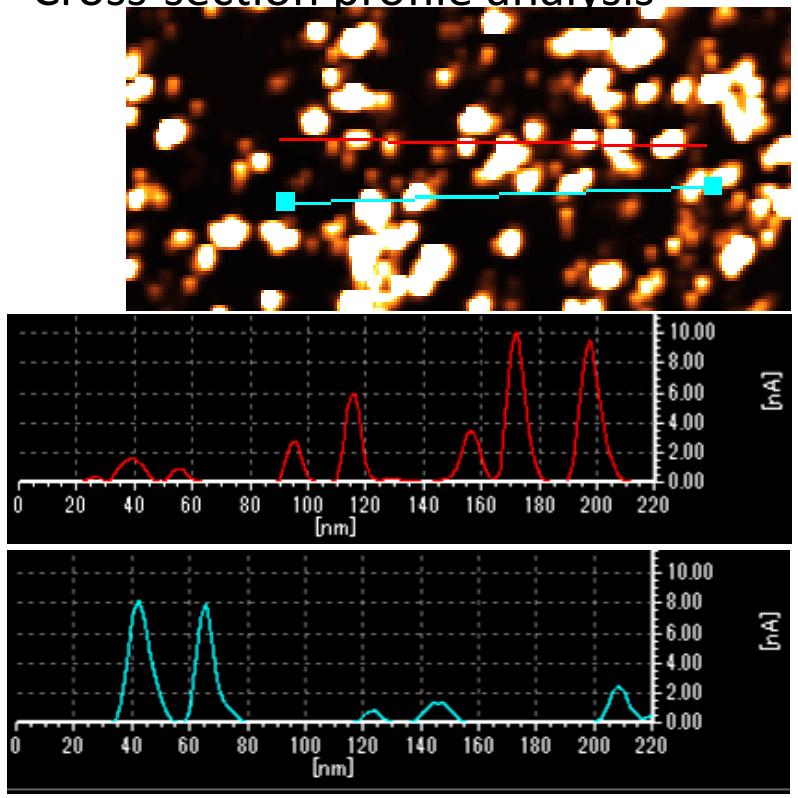


Figure 2 3D overlay image of the AFM and Current images and the cross-section profile analysis of the organic semiconductor thin film solar cell (P3HT-PEDOT)

Acknowledgement

We would like to thank the National Central University / RCNPV for offering the organic semiconductor thin film solar cell (P3HT-PEDOT) sample.

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