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Investigation of Conductive Island Growth on Polystyrene by Plasma Implantation

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As bio-electronic sensors and devices structures approach the nanometer scale, it is necessarily to recognize the electronic conducting properties. In this work, conductive Atomic Force Microscopy (c-AFM) has been used to investigate the conductivity island-like structure on polystyrene substrate. The surface morphology of titanium ions implanted polystyrene substrate and its conductivity have been simultaneously mapped. Our conducting measurements (I-V and dI/dV curve) show that the coefficient Cnx on the conductivity curve has a small finite value and Cn(1-x) is near zero for bias voltages less than 3 V. Assume that the charge carriers offered production contact area to the substrate and our I-V curve approach constant value we can conclude that our islands have a columnar structure growth mode. That is, the covered area is not increased if the film is grown by columnar structure growth. In addition, electron tunneling and conducting channel or island-like structures on polymer substrate can be a good candidate for the future of nano-plastic-electronic devices.