

Abstract Submitted
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Electron Hopping in Conducting Polymers in the Presence Of Mobile Ions¹ VLADIMIR PRIGODIN, FANG HSU, JANE PARK, ARTHUR EPSTEIN, Physics Department, The Ohio State University, Columbus, OH 43210-1106 — We present the theoretical analysis for electrochemical transistors with the conductivity governed by the gate potential through bulk charging/discharging of the active channel. The predicted I(V) characteristics do not agree with the experimental dependencies for conducting polymer based transistors [1]. We suggest that the field effect in conducting polymers is related to their structural peculiarities. The large free volume within the polymer network enables ions to easily move into and out of the polymers. The main effect of ion insertion is breaking of the percolation network by removing critical hopping sites and, as a result, producing the conductor-nonconductor transition. The application of the present mechanism to the field effect in conducting polymers is discussed. [1] J. Liu, et al., **J. Appl. Phys.** **92**, 6033-6038 (2002); A.J. Epstein, et al., **Current Applied Physics**, **2**, 339-343 (2002); H. Okuzaki, et al., **Synth. Met.** **137**, 947-948 (2003); F.C. Hsu, et al., to be published.

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