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Coulomb gap variable range hopping in graphitized polymer surfaces YURI KOVAL, IRINA LAZAREVA, PAUL MÜLLER, Department of Physics, Erlangen-Nurnberg University — Polymer surfaces were graphitized by low-energy ion irradiation. We show that the conductance of the graphitized surfaces gradually increases with the energy of ions and the temperature of irradiation. At rather modest ion energies ($\sim$1000) eV and irradiation temperatures ($\sim$400°C) the transition to a metallic state was observed. We investigated electric transport on the insulating side of metal-insulator transition (MIT). Temperature dependences of conductance and current-voltage characteristics at low temperatures were measured and analyzed. We found that electric transport in the graphitized surfaces can be described by 2D Coulomb gap variable range hopping. Similar to low-temperature results in crystalline 2D systems, the pre- factor is temperature independent and has a unique value e^2/h. In the activationless regime of hopping, the pre-factor of current-voltage characteristics has a significantly smaller but also unique value $\sim e^2/5h$. We show that the localization length is constant for all samples. The dielectric constant gradually increases approaching MIT from the insulating side. Due to an extremely high bare density of states, the Coulomb gap persists up to high temperatures. We explain this by a strong inhomogeneity of density of states in the graphitized surfaces.

Yuri Koval
Department of Physics, Erlangen-Nurnberg University

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