

Tunneling Effect Due to UV Irradiation in Organic Cu-Pc/Bi₂Sr₂CaCu₂O_{8+d} Tunnel Junction

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We studied the nonequilibrium superconductivity due to tunnel injection of polaronic quasiparticle (QP) from organic photoconductor. The transport properties of an organic copper (II) phthalocyanine (Cu-Pc)/d-wave superconductor were investigated in dark and under ultraviolet (UV) radiation for performance of a novel high- T_c superconducting three terminal device. We observed that the injection of polaronic QP from the organic Cu-Pc film into the Bi₂Sr₂CaCu₂O_{8+d} film generated a substantially larger nonequilibrium effect as compared to the normal QP injection current. We could increase the current gain by UV excitation of the organic photoconductor injector. The tunneling spectroscopy of a Cu-Pc/BSCCO junction exhibited a small enhancement of the zero bias conductance peak under the UV excitation. The above phenomena are of importance in developing optically controlled three terminal superconducting device. [This work was support by KOSEF Joint Research Project under The Korea-Japan Basic Scientific Promotion Program (2000-6-114-01-2)]

keywords : Organic Copper (II) Phthalocyanine, Bi₂Sr₂CaCu₂O_{8+d}, polaronic quasiparticle injection, nonequilibrium state.