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Transport Characteristics of Superconductor-based Light-Emitting-Diode Structure[1] RYOTARO INOUE, Tokyo Univ. of Science, HIDEAKI TAKAYANAGI[2], Int. Center for Materials NanoArchitechtonics, NIMS, TATSUSHI AKAZAKI, NTT Basic Research Lab., KAZUNORI TANAKA, Hamamatsu Photonics Central Research Lab., HIROTAKA SASAKURA, IKURO SUEMUNE, Hokkaido Univ. — We investigated the transport characteristics between two niobium (Nb) superconducting electrodes at the n-type semiconductor (n- InGaAs) side of a superconductor-based Light-Emitting-Diode where a Josephson junction is formed. The current-voltage characteristics of the Josephson junction are found to be controlled by applying voltage to the normal electrode at the p-type semiconductor (p-InP) side. The mechanism of the control is switched from gate regime to injection regime when the applied voltage is increased and current injection takes place. At the crossover region between two regimes, the current-voltage characteristics of the Josephson junction show an extraordinary sensitivity to the applied voltage to the normal electrode at the p-type semiconductor. This sensitivity is considered to be due to the radiative recombination process at the superconductor-based Light-Emitting Diode.

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[2]also affiliated to Tokyo Univ. of Science

Ryotaro Inoue
Tokyo Univ. of Science

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