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Observation of abrupt first-order metal-insulator transition in GaAs-based two-terminal devices HYUN-TAK KIM, DOO-HYEB YOUN, BYUNG-GYU CHAE, KWANG-YONG KANG, ETRI, YONG-SIK LIM, Konkuk U. — An abrupt first-order metal-insulator transition (MIT) as a jump of the density of states is observed for Be doped GaAs, which is known as a semiconductor, by inducing very low holes of approximately n_p $\approx 5\times10^{14}$ cm^{-3} into the valence band by the electric field; this is anomalous. In a higher hole doping concentration of n_p $\approx 6\times10^{16}$ cm^{-3}, the abrupt MIT is not observed at room temperature, but measured at low temperature. A negative differential resistance are also observed as further evidence of the MIT. The upper limit of the temperature allowing the MIT is deduced to be approximately 440K from experimental data. The abrupt MIT rather than the continuous MIT is intrinsic and can explain the "breakdown" phenomenon (unsolved problem) incurred by a high electric field in semiconductor devices.(ref:NJP 6 (2004)52:(www.njp.org))

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