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Temperature Dependence of doped ZnO Nanowire Photoconductance DONGDONG LI, Univ of Southern California, LIANG ZHAO, Tsinghua Univ, PAICHUN CHANG, Univ of Southern California, RUQIAN WU, UC Irvine, JIA GRACE LU, Univ of Southern California — ZnO nanowires doped with impurity atoms have been fabricated by pulsed laser-assisted chemical vapor deposition method. The as-synthesized nanowires are constructed as a four-probe field-effect transistor with a global back gate. The temperature dependant transport properties based on nanowire field effect transistor are investigated. The ionized impurity scattering is predominant at low temperatures, which has a temperature dependence of $T^{1.5}$. While at high temperatures, electron-acoustic phonon scattering dominates, yielding a temperature dependence of$T^{-1.5}$ The conductance is dramatically affected by light illuminations - HeNe Laser (632 nm) and UV (254 nm). A smooth transition can be observed under laser illumination, *i.e.* the resistance reaches a minimum at certain temperature, then rises steadily with continued increase of temperature. This stems from the drastic reduction of electron mobility due to the enhanced electron-phonon interaction. In contrast, two reproducible jumps under UV irradiation are observed for all doped nanowires. This originates from the existence of deep defect levels, which locates more than 2 eV below the conduction band edge. They serve as charge traps for electron excitation from the valence band.

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