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**Magnetodielectric coupling in Au/GaAs:Si Schottky barriers**[1] S. TONGAY, A.F. HEBARD, University of Florida, Y. HIKITA, H. HWANG, The University of Tokyo — A surprisingly large (>20%) negative magnetocapacitance in non-magnetic Au/GaAs:Si Schottky barriers is attributed to a magnetic field ($H$) induced increase in the binding energy of the shallow donor Si impurity atoms. Capacitance ($C$) dispersion is used to identify the impurity ionization and capture processes that give rise to an $H$-dependent density of ionized impurities $N_d(H)$in the depletion region. Internal photoemission experiments confirm that the large $H$-induced shifts in the built-in potential $V_{bi}$, inferred from Mott-Schottky ($1/C^2$ versus voltage) measurements, are not due to an $H$-dependent Schottky barrier height (SBH), thus requiring a modification of the abrupt junction approximation which identifies the dependence of $V_{bi}$ on $N_d(H)$rather than the SBH. The linearity of the Mott-Schottky plots is preserved, as experimentally observed. The underlying magnetodielectric coupling not only allows a new opportunity for the tuning of the dopant carrier density by an external means (magnetic field) but should be important for understanding the behavior of related interfacial structures incorporating dilute magnetic semiconductors and/or complex oxides.

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