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Optical Properties of Magnetic Semiconductors

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We have employed Infrared Spectroscopy (IR) and Ellipsometry to explore the band structure of thin films and digitally doped superlattices of $\text{Ga}_{1-x}\text{Mn}_x\text{As}$, prepared in the group of D.D. Awschalom (UCSB). These measurements reveal the important role played by the Mn induced impurity band in the band structure and ferromagnetism of $\text{Ga}_{1-x}\text{Mn}_x\text{As}$. Our IR work on Digital Ferromagnetic Heterostructures reveals a unique ability to tune their optical properties as well as their intrinsic electronic structure without changing the doping/defect level. This work is in collaboration with E.J. Singley, D.N. Basov (University of California, San Diego) J. Stephens, R.K. Kawakami, and D.D. Awschalom (University of California, Santa Barbara).