

Ferromagnetic Coupling in Mn-doped ZnO Mediated by Hydrogen

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In the light of spintronics and spin-based information technology, ferromagnetic diluted magnetic semiconductors (DMSs) have been extensively studied. Since the theoretical prediction of room-temperature ferromagnetism in DMSs, Mn-doped II-VI DMSs have attracted considerable interest, intense efforts having been made for DMSs with Curie temperatures at or above room temperature. Nonetheless, the origin of the ferromagnetism has yet to be clarified. While hole-mediated magnetism in p-type materials was predicted theoretically, ferromagnetism in n-type Mn-doped ZnO (ZnO:Mn) films has called for attention on the carrier-mediated magnetism. Shallow donors in undoped and doped ZnO systems have been studied in this work by means of electron paramagnetic resonance (EPR) and nuclear magnetic resonance (NMR) measurements. Here, we report experimental evidences for coupling of hydrogen shallow donors and Mn ions in Mn-doped ZnO mediating short-range ferromagnetic spin-spin interaction, theoretically suggested previously but not verified thus far.

참고문헌

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