

Physica Status Solidi (B) Basic Research 2013 vol.250 N10, pages 2137-2140

High-frequency EPR, ESE, and ENDOR spectroscopy of Co- and Mn-doped ZnO quantum dots

Baranov P., Orlinskii S., de Mello Donegá C., Schmidt J.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Co- and Mn-doped ZnO quantum dots (QDs) with ZnO/Zn(OH)₂ core-shell structure were studied using high-frequency electron paramagnetic resonance (EPR), electron spin echo, and electron-nuclear double resonance (ENDOR) at low temperature. The shape of the EPR spectrum of cobalt ions was observed to change as a result of Co²⁺ coupling with optically created shallow donors (SDs). This, along with a shift of SDs line, is a direct demonstration of interaction between the magnetic ion and donor electron in confined system of ZnO QD. ENDOR resonance of the ¹H hydrogen nuclei detected by the EPR signal of Co²⁺ and Mn²⁺ evidence the hyperfine coupling between these ions, located in the ZnO core, and the protons outside the quantum dot core in the shell. © 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

<http://dx.doi.org/10.1002/pssb.201200948>

Keywords

Co, Electron nuclear double resonance, Electron paramagnetic resonance, Electron spin echo, Mn, Shallow donor, ZnO