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Streszczenie rozprawy doktorskiej pt. "Impurity band vs valence band as the origin of itinerant holes in ferromagnetic (Ga,Mn)As" (w języku angielskim)

(Ga,Mn)As, the dilute ferromagnetic semiconductor (DFS) has been a subject of excessive interest because of its controllable magnetic properties combined with the well known III-V semiconductor technology. Mn-doped GaAs became a prototype material for semiconductor spintronics. The Mn_{Ga} substitutional ions in GaAs act as acceptors and are a source of magnetic moments. Long-range ferromagnetic interactions mediate between the Mn^{2+} ions via the indirect interaction with the spin polarised holes. Nevertheless, there is an ongoing discussion whether the holes reside in the valence band or within the Mn impurity band, which also defines the dominating type of indirect magnetic interactions (double exchange or Ruderman-Kittel-Kasuya-Yosida/p-d Zener model). In this thesis, the band structure of (Ga,Mn)As epitaxial layers is studied by means of photoreflectance spectroscopy (PR) supported with the supplementary characterisation techniques: Raman spectroscopy, high-resolution X-ray diffraction (HR-XRD), superconducting quantum interference device (SQUID) magnetometry, spectroscopic ellipsometry (SE), and angle-resolved photoemission spectroscopy (ARPES). The results indicate the valence band source of holes in the ferromagnetic (Ga,Mn)As being consistent with the p-d Zener model of magnetism rather than the impurity band model.

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