

Self-Assembled Diluted Magnetic Semiconductor Quantum Dots

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Abstract:

A review will be given of diluted magnetic semiconductor quantum dots self-assembled during molecular beam epitaxy process. Methods of introducing magnetic (e.g., manganese) ions into the dots in a controllable fashion will be described. In the case of dots containing numerous magnetic ions an analogy with bound magnetic polarons studied previously both in the case of bulk materials as well as in quantum wells is to be emphasized. A very interesting case of a dot contained few (even single) magnetic ions is illustrated by experiments published in the literature so far. The behaviour of dots under strong excitation and in the presence of electric fields represents another topic that will be addressed in the talk. In particular filling of higher shell of an “artificial atom” - as a quantum dot is sometimes referred to – and formation of various excitonic special both neutral and charged is to be shown in the optical studies of isolated quantum dot. Consequences of such possibilities on the magnetic properties of Mn ions contained in the dot will be discussed.