An insight into the origin of room-temperature ferromagnetism in SnO$_2$ and Mn-doped SnO$_2$ quantum dots: an experimental and DFT approach

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Supporting Information

1. FWHM of (110) diffraction peak as a function of Mn concentration and magnified diffraction peak (110).

2. Lattice parameters as a function of Mn concentration with error bars (Graphical representation).

3. Deconvoluted room temperature Raman spectra.

4. Temperature dependent Raman spectra and temperature dependence of classical Raman modes.
Fig. S1 (A) FWHM of (110) diffraction peak as a function of Mn concentration (B) Magnified diffraction peak (110) a) Undoped SnO₂ b) 2% Mn doped SnO₂ c) 4% Mn doped SnO₂ d) 6% Mn doped SnO₂ and e) 10% Mn doped SnO₂ QDs.
Fig. S2 Lattice parameter as a function of Mn concentration with error bars.
Fig. S3 Deconvoluted room temperature Raman spectra measured in the region 50–400 cm$^{-1}$ of a) Undoped SnO$_2$ and b) 2% Mn doped SnO$_2$ c) 4% Mn doped SnO$_2$ d) 6% Mn doped SnO$_2$ and e) 10% Mn doped SnO$_2$ QDs.
Fig. S4 Deconvoluted room temperature Raman spectra measured in the region 400-900 cm\(^{-1}\) of a) Undoped SnO\(_2\) and b) 2\% Mn doped SnO\(_2\) c) 4\% Mn doped SnO\(_2\) d) 6\% Mn doped SnO\(_2\) and e) 10\% Mn doped SnO\(_2\) QDs.
Fig. S5 Temperature dependent Raman spectra measured in the region 350-900 cm$^{-1}$ of a) Undoped SnO$_2$ and b) 2% Mn doped SnO$_2$ c) 4% Mn doped SnO$_2$ d) 6% Mn doped SnO$_2$ and e) 10% Mn doped SnO$_2$ QDs.
Fig. S6 Temperature dependent Raman spectra measured in the region 50-350 cm\(^{-1}\) of a) Undoped SnO\(_2\) and b) 2% Mn doped SnO\(_2\) c) 4% Mn doped SnO\(_2\) d) 6% Mn doped SnO\(_2\) and e) 10% Mn doped SnO\(_2\) QDs.
Fig. S7 Temperature dependence of classical Raman modes of a) Undoped SnO$_2$ b) 2% Mn doped SnO$_2$ c) 4% Mn doped SnO$_2$ d) 6% Mn doped SnO$_2$ and e) 10% Mn doped SnO$_2$ QDs. (scatter points are experimental data and red line represents fitting using straight line equation (3))