MAGNETISM IN LOW-DIMENSIONAL COMPOUNDS OF RARE EARTH METALS

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Metal-rich halides of rare earth elements lie on the borderline between salts and metals. They are particularly interesting due to the presence of localised or itinerant (d) electrons in low-dimensional bond systems together with localised (f) electrons. Out of a large body of new compounds and structures one- and two-dimensional systems are chosen to illustrate magnetic phenomena governed by d-d interaction, frustration effects etc. Special emphasis is given to 2 D metallic systems like GdI_2 which orders ferromagnetically at 290 K and exhibits GMR with a negative magnetoresistance of 70% at room temperature in a field of 7 T. Structures based on twin-layers of metal atoms allow extensive compositional variations with respect to the atoms placed between the twin-layers as will be discussed for the interstitials H, C and Fe. The hydride halides $LnXH_n$ offer a way to reversibly tune the (d) carrier density via the H content. For n = 2 they are insulators, and for $0.67 \leq n \leq 1.00$ the phases are metallic. Detailed investigations of the CE-type antiferromagnetism of $TbBrH_n$ are reported which becomes a spin glass at n = 0.67.