Different magnetic moment in Mn-doped amorphous group-IV semiconductors: a comparison study between Si and Ge matrices.\textsuperscript{1} LI ZENG, ERIK HELGREN, University of California, Berkeley, CINTHIA PIAMONTEZE, ELKE ARENHOLZ, ALS, Lawrence Berkeley Lab, Berkeley, CA, ADDISON HUEGEL, FRANCES HELLMAN, University of California, Berkeley — Mn-doped amorphous Si ($a$-Si) and Ge ($a$-Ge) are prepared by $e$-beam co-evaporation for a wide range of concentrations (0.5-18 at.\%) to explore the Mn local moment in group-IV semiconductors. We find that Mn behaves quite differently in these two matrices: in $a$-Si, the Mn local moment is quenched, even for the lowest doping (0.5 at.%), while in $a$-Ge, a large Mn moment is observed, with a spin-glass ground state. X-ray absorption spectra (XAS) of $a$-Mn$_x$Si$_{1-x}$ have very broad $L$-edge absorption peaks which correlate with the quenched magnetic state. The quenched Mn moment in $a$-Si is unexpected and can be understood by the formation of Anderson-localized itinerant states even on the insulating side of the metal-insulator transition. By contrast, XAS of $a$-Mn$_x$Ge$_{1-x}$ show atomic multiplets. $a$-Mn$_x$Si$_{1-x}$ has positive magnetoresistance (MR) like typical non-magnetic disordered electronic systems, while $a$-Mn$_x$Ge$_{1-x}$ has negative MR, consistent with magnetization data.

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