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Slow Relaxation of Magnetization in a Family of Linear $Mn^{III}M^{III}Mn^{III}$ (M = Fe, Ru, Os) Compounds

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The experimental and theoretical study of a family of linear trimeric $[NEt_4]\{[Mn(L)]_2[M(CN)_6]\}$ (M = Fe, Ru, Os) compounds is reported. All three complexes demonstrate slow relaxation of magnetization at low temperatures. The theoretical model for the explanation of the magnetic behavior (the magnetic susceptibility as a function of temperature and magnetization as a function of the applied magnetic field) includes the spin-orbital interaction acting within the ground $^2T_1$ multiplet of the Fe^{III}, Ru^{III} or Os^{III} ion, the axial crystal field that splits this multiplet into an orbital singlet and orbital doublet, the zero-field splitting for the Mn^{III} ions, the isotropic exchange interaction in the M-Mn pairs as well as the intercluster interaction taken within the mean field approximation. The proposed model provides a good agreement between the observed and calculated magnetic behavior. The low-lying energy levels form the energy barriers for magnetization reversal for all examined compounds. The calculated heights of these barriers are close to the observed ones.