

Polynuclear Core $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}]$ in the Molecular Magnets Design

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Mixed-valence manganese clusters, in particular, polynuclear oxocarboxylate clusters of manganese, $[\text{Mn}^{\text{II}}_x\text{Mn}^{\text{III(IV)}}_y\text{O}_z]$, display a non-typical magnetic behavior - slow relaxation of magnetization at low temperatures. This led to the creation of a specific family of magnets, so-called single-molecule magnets. Single-molecule magnets are of particular interest because of these are magnetic domains of strict definite dimensions. Therefore, using multinuclear manganese compounds shows great promise in design of heterospin complexes. We synthesized a large group of such complexes based on $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{Thf})_4]$ core with 2-R-4,4,5,5-tetramethyl-4,5-dihydro-1H-imidazolyl-3-oxide-1-oxyl (NIT-R, R = H, Me, Et, *p*-Py, *n*-butylpyrazole). Both chain polymer $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{Thf})_2(\text{NIT-Me})\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{Thf})(\text{CH}_2\text{Cl}_2)(\text{NIT-Me})]$ and $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{NIT-Me})_2]$, possessing a diamondlike frame structure, and dumbbelllike $[(\text{EtOAc})_3\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{NIT-Me})\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{EtOAc})_3]$ molecules contain $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}]$ cluster fragments linked by NIT-Me bridging molecules. Among the latter a new molecular magnet $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{Thf})_2(\text{NIT-Me})\text{Mn}_6(\text{O})_2\text{Piv}_{10}(\text{Thf})(\text{CH}_2\text{Cl}_2)(\text{NIT-Me})]$ with $T_c=3.5$ K has been found [1]. It was shown that the formation of high dimensional crystal structure has the exacting requirements for structure complementary of $[\text{Mn}_6(\text{O})_2\text{Piv}_{10}]$ and NIT-R, which can be realized only for R = CH₃.

[1] Ovcharenko V., Fursova E., Romanenko G., Ikorskii V., *Inorg. Chem.*, 2004, **43**, 13332.

Keywords: molecular magnets, radicals, cluster compounds