Slow magnetic relaxation in the single-ion magnet $CsNd(MoO_4)_2$

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The present work is devoted to the study of the magnetic relaxation in $CsNd(MoO_4)_2$. The absence of a phase transition to the ordered state down to 50 mK predetermines $CsNd(MoO_4)_2$ as the candidate for novel mononuclear lanthanide-based single-ion magnets. Nd^{3+} ions with the ground state $^4I_{9/2}$ are responsible for the magnetic properties. Low-symmetry crystal field splits this state into 5 doublets with large energy separation between the ground and first excited doublet, inducing easy-axis anisotropy. AC susceptibility measurements performed in various magnetic fields (B = 0 – 5 T) and frequencies (f = 1 Hz – 1kHz) revealed rather complex field-induced slow magnetic relaxation. Temperature dependencies of the relaxation times at the different time scale extracted from Cole-Cole diagrams indicate several relaxation channels. Possible origin of the nontrivial observed relaxation phenomenon considering quantum tunnelling and nuclear degrees of freedom is discussed.

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