New Ir and Rh oxides with spinel-related structure

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We report for the physical properties of two new transition metal oxides, $Na_4Ir_3O_8$ and $LiRh_2O_4$. $Na_4Ir_3O_8$, a Mott insulator with d^5 (LS) Ir^{4+}, crystallizes in hyper-Kagome structure, which can be viewd as a cation-ordered spinel structure. We show that the ground state of this system is a spin liquid due to geometrical frustration. Although the temperature dependence of magnetic susceptibility yields a large Curie-Weiss constant of -650 K, the system does not show any indication of magnetic ordering down to 1.8 K, the lowest temperature measured. The specific measurements indicate that the presence of a large magnetic specific heat with unusual $T^{2.5}$ dependence. An interesting challenge now arises. What kind of orbital state of Ir^{4+} can stabilize such a spin liquid state on hyper-Kagome lattice? A metal insulator transition of new mixed valent (1:1 Rh^{3+}, Rh^{4+}) spinel oxides, $LiRh_2O_4$ will be also reported.