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Spin transport through one-dimensional transition metal organometallic cluster systems IVAN STICH, LUCIA HORVATHOVA, RENE DERIAN, Inst. of Physics, Slovak Academy of Sciences, Bratislava, LUBOS MITAS, Dept. of Physics, North Carolina State University, Raleigh — Using very accurate quantum Monte-Carlo methods we have studied vanadium-benzene multi-decker clusters, V_nBz_{n+1} , in the range $n = 1 - 3$. The most important prospective applications of these and related systems are in spintronics as spin filters, which requires them to be half-metal ferromagnets, featuring a semiconducting gap for majority spin electrons and metallic behavior for minority spin electrons. We find that while magnetic structure of these systems is consistent with ferromagnetic coupling, their electronic structure is not consistent with half-metallic behavior as previously assumed, but rather this system is a ferromagnetic insulator with large and broadly similar \uparrow -/ \downarrow -spin gaps implying thus a limited potential of these materials for spintronic applications unless they are further modified or functionalized.

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