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Is there really spin transport in Alq_3 spin-valves?[1] J. SAMUEL JIANG, J.E. PEARSON, S.D. BADER, Argonne National Laboratory — There have been reports of GMR and extremely long spin relaxation in Alq_3- based spin valves.[2] However, it has also been suggested that direct tunneling through locally-thin regions of the Alq_3 layer could be the magnetoresistance (MR) mechanism, i.e. the reported MR may be due to artifacts rather than spin transport via the molecular levels in Alq_3.[3] We present transport measurements on Alq_3-based spin valves and unipolar devices where the Alq_3 thickness is beyond the tunneling limit. The I-V characteristic is highly asymmetric and strongly temperature- dependent, different from the behaviors of devices where GMR has been reported. The charge transport in the Co/Alq_3/Fe spin valves is by holes only and is injection- limited. More importantly, we observe no measurable MR in our non-tunneling Co/Alq $_3$/Fe spin valves, or in Co/AlO_x/Alq_3/Fe structures where spins can be injected via the AlO_x barrier. These results indicate that spin transport in Alq_3 is unlikely.

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[2]Z. H. Xiong et al. Nature, 427, 821 (2004); S. Pramanik et al. Nature Nanotech. 2, 216 (2007).
[3]W. Xu, et al. Appl. Phys. Lett. 90, 072506 (2007).

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