Is there really spin transport in Alq$_3$ spin-valves? 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. 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$_3$. 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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