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Frequency dependence of organic magnetoresistance¹ FUJIAN WANG, JAMES RYBICKI, RAN LIN, KENT HUTCHINSON, JIA HOU, MARKUS WOHLGENANT, University of Iowa — Organic magnetoresistive (OMAR) devices show a large enough magnetoresistive response (typically 10%) for potential applications as magnetic field sensors. However, applications often require sensing high frequency magnetic fields, and the examination of the frequency-dependent magnetoresistive response is therefore required. Analysis of time constants that limit the frequency response may also shed light on the mechanism behind the OMAR effect, because different OMAR mechanisms occur at different time scales. In our experiments, the AC magnetic field is supplied by a coil with a ferrite core which is driven by a function generator. The AC magnet shows a frequency response that is almost flat up to 1MHz. We found that the OMAR frequency limit is about 10 kHz for a typical organic semiconductor device and at least 100 kHz for devices made from a doped polymer film. We also performed capacitance and conductance vs. frequency measurements to understand the origin of the observed limit frequencies.

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Fujian Wang
University of Iowa

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