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Fabrication of organic spin-valve devices using indirect deposition SHEN WANG, YUJUN SHI, LI LIN, BINBIN CHEN, FENJUAN YUE, DI WU, Nanjing University — The organic spin valves (OSVs) comprised of two ferromagnetic (FM) electrodes separated by an organic spacer are the principal device structures to study the spin-dependent transport. Normally, the top FM electrodes are directly deposited on top of the organic layer. The vaporized FM atoms can penetrate or diffuse into organic layer and form the so-called ill-defined layer, which is as thick as 80-100 nm. In this work we report a reliable method for fabricating high quality, reproducible OSVs. We use indirect deposition method, which relies on the scattering of the evaporated metallic atoms with inert gas to reduce kinetic energy, to deposit the Co electrode on top of the organic layer Alq_3. This method significantly suppresses the penetration of Co atoms into Alq_3 layer during deposition process, in comparison with devices fabricated by conventional direct deposition method. The improved Alq_3/Co interface is further confirmed by comparing the magnetic moment of depositing Co onto Alq_3 and Si substrates by indirect and direct deposition methods. And an OSV effect in $La_{0.7}Sr_{0.3}MnO_3/Alq_3$/Co devices is demonstrated at room temperature, indicating the improvement of spin injection efficiency at sharp Alq_3/Co interface.

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