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Effect of thermal fluctuation on the recoil loops of exchange-coupled nanocomposite magnets CHUANBING RONG, YUZI LIU, J. PING LIU, Department of Physics, University of Texas at Arlington, Arlington, TX 76019 — Exchange-coupled hard/soft nanocomposite magnets have attracted great attention due to the very high potential energy product. One of the most effective ways to characterize the exchange-coupling strength in the nanocrystalline magnets is the measurement of recoil loops. It is often noted that the recoil curves are widely open for the hard/soft nanocomposite magnets but are narrow and even close for the single-phase magnets. In this work, we studied recoil loops of the $FePt/Fe_3Pt$ nanocomposite magnets. It was interesting to find that the parameter that describes the openness of the loops, Δm_{rc}^m, is significantly dependent on the sweep rate of applied field, especially for the nanocomposite magnets with high soft-phase content, where Δm_{rc}^m is maximum difference between upper and lower magnetization curves of the recoil loops. The quantitative analysis shows a reciprocally linear relation between Δm_{rc}^m and the activation volume, which means that the recoil loops are intimately related to the thermal fluctuation. The large open area of the nanocomposite magnets compared to that of single phase magnets is attributed to the more unstable magnetization process in the exchange-hardened soft phase.

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