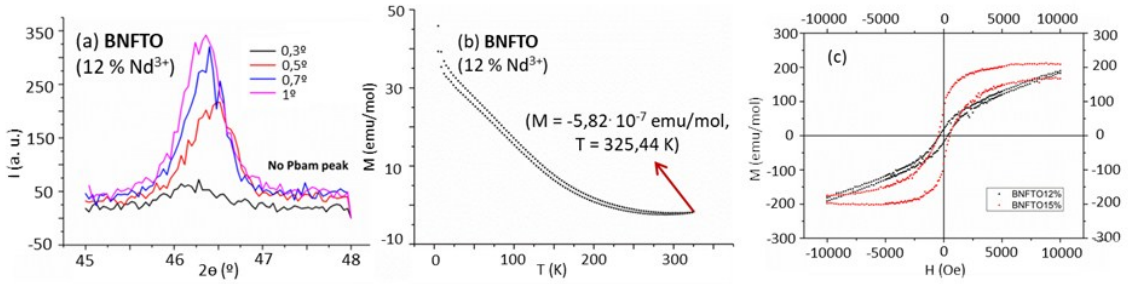

Figure S2. Synthesis and characterization of a BNFTO thin film with a nominal composition containing a smaller amount of neodymium: 12 mol % of Nd^{3+}, $Bi_{0.85}Nd_{0.12}FeO_3$. This has been formulated to fall outside the postulated MPB (morphotropic phase boundary) and, consequently, no presence of the *Pbam* phase is ever detected on the GID-XRD analyses (nor even at the lowest incidence angle of 0.3º). The thermal dependence of the magnetization upon ZFC and FC conditions also evidence no structural transitions and the corresponding M-H hysteresis loops report a much lower remnant magnetization for this composition.