RECENT PROGRESS IN FeCo-BASED SOFT MAGNETIC NANOCRYSTALLINE ALLOYS

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The continuing interest in FeCo-based nanocrystalline alloys is motivated mainly due to their ability to combine a high saturation magnetic flux density with good magnetic softness. In order to further optimize the magnetic performance of these alloys it is important to deepen knowledge about the influence of the processing techniques that can be used to tailor their properties for specific applications. One possible way, which can be employed for this purpose, is the thermal processing under the presence of external magnetic field, called also „magnetic annealing". A special attention of our work is devoted to the study of the effects of the magnetic annealing in order to produce a controllable uniaxial anisotropy in the series of Fe-Co-(Nb,Mo)-B and Fe-Co-B-Cu amorphous and nanocrystalline alloys with different ratios of Fe/Co atoms. We show that the annealing without the presence of external magnetic field leads to an appreciable increase of the coercivity and the corresponding hysteresis loops often exhibit a presence of steps due to the depinnig of domain walls from the positions stabilized during the heat treatment. After annealing in transverse magnetic field one can obtain sheared loops with tunable slope and good field linearity. A heat treatment under the presence of longitudinal magnetic field results in squared hysteresis loops characterized by very low coercive field values in the range of 2 - 6 A/m. Such low coercivity values are superior to those previously reported for FeCo-based amorphous and nanocrystalline alloys. Examples of our recent work on the soft magnetic nanocrystalline alloys optimized for sensor applications will be briefly highlighted.

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