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Influence of Ag substitution for Cu in Finemet on the crystallization and magnetic properties

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The alloy ribbons $Fe_{73.5}Si_{13.5}B_9Nb_3Cu_{1-x}Ag_x$ (x = 0.5, 1.0) have been prepared by fast quenching technology on a single copper wheel. The ribbons are of 25 m thick and 8 mm wide. Both as-cast compositions are in amorphous state. The as-cast ribbons have quite good rectangular hysteresis loops showing the pinning of displacement of domain walls. In the DSC patterns of ribbon with x = 0.5 there are two sharp exothermal peaks occurring at T_{p1} = 564°C and T_{p2} = 698°C, respectively. With Ag fully substituted for Cu in Finemet, the first crystallization exothermal peak of -Fe(Si) phase is very sharp expressed at T_{p1} = 602°C - quite higher than that of pure Finemet.Because the crystallization of -Fe(Si) phase strongly occurred in very narrow temperature range, it is not easy to find out optimum regime of annealing in order to obtain good soft magnetic properties of studied nanocomposites. Therefore, the crystallization volume fraction as well as the nanosize of crystallites is strongly depending on the annealing temperature and keeping time. The higher Ag content substituted for Cu the higher coercivity is obtained for as-cast and annealed ribbons. The role of Ag in the crystallization of nanocomposite material is discussed.