

# Processable nanocrystalline Fe-based alloy with excellent soft magnetic properties

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Nanocrystalline alloys, NANOMET [1] have attracted much attention as high performance magnetic core materials. Their properties have been investigated by using the lab.-scale ribbon of about 20  $\mu\text{m}$  in thickness and 5 mm in width. For practical use, it is important to develop alloys based on the dependence of ribbon size on magnetic properties. A newly developed nanocrystalline (Fe,Co)-Si-B-P-Cu alloy ribbon (10 mm in width) with high (Fe,Co) content of 85.2 at.% has better soft magnetic properties such as high  $B_s$  of 1.84 T and low  $H_c$  of 6.5 A/m. The critical thickness ( $t_c$ ) of the ribbon showing low  $H_c$  of 7 A/m is 30  $\mu\text{m}$ . It is much thicker than that of the high  $B_s$  (>1.8 T) Co-free alloys, where  $t_c$  is 18  $\mu\text{m}$ . In addition, the ribbon with 50 mm in width was successfully produced. The present alloy exhibits similar magnetic properties regardless of ribbon size, which is suitable for practical application. In this paper, the applicability will also be discussed on the basis of core loss evaluation.

## References:

[1] A. Makino, IEEE Trans. Magn., 48 (2012) 1331.