## Magnetic Properties of Fe-Al<sub>2</sub>O<sub>3</sub> Soft Magnetic Composites

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Abstract. Soft magnetic composites (SMC) are ferromagnetic powder particles coated with electro-insulating layer, exhibiting useful magnetic properties. The examination of magnetic properties and magnetization processes in Fe-based SMC with Al<sub>2</sub>O<sub>3</sub> electro-insulating layer created by dry coating is described. Dry coating procedure (mechano-fusion) to coat larger Fe particles (with particle size from 125  $\mu$ m to 200  $\mu$ m) by smaller Al<sub>2</sub>O<sub>3</sub> particles (with particle size 1  $\mu$ m-40  $\mu$ m) was used without any other solvents and binders.

Two series of ring-shaped samples with rectangular cross-section were prepared. The coating process of the first series of samples lasted 15 min and the coating process of the second series of samples 30 min. The samples in each series have different fraction of Al<sub>2</sub>O<sub>3</sub> (2 wt.%, 5 wt.%, 10 wt.% and 15 wt.%).

Electrical resistivity, coercivity, complex permeability, initial magnetization curves, AC and DC loss were examined.

We found out that shorter dry coating process leads to improvement of magnetic properties of investigated samples. The optimum fraction of  $Al_2O_3$  is between 5 wt.%-10 wt.%, when the samples exhibit the lowest loss and the highest permeability.

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