

Magnetic Properties of Fe-B-Si Amorphous Alloy with Surface Films

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Fe-B-Si

(1)  $\text{SiO}_2/\text{Li}_2\text{O} = 3.5$

(2)  $\text{SiO}_2/\text{Li}_2\text{O}=7.5$

(3)

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Synopsis :

Surface coatings on Fe<sub>79</sub>-5B<sub>12</sub>Si<sub>8</sub>-5 (mol %) amorphous alloy ribbons have studied to obtain high insulating resistance and high corrosion resistance. (1) surface coating of lithium silicate with a molecular ratio  $\text{SiO}_2/\text{Li}_2\text{O} = 3.5$  has been found to induce compressive stress in the ribbons. It achieves constant permeability to an extent of approximately 2000 A/m and increase in the iron loss of the amorphous alloy. (2) A surface coating of lithium silicate with  $\text{SiO}_2/\text{Li}_2\text{O}=7.5$  has no mechanical interactions with the ribbons and does not deteriorate magnetic properties. This surface coating is available for Fe-based amorphous alloy ribbons to be used for transformer core materials. (3) Although aluminasol surface coating has no mechanical interaction with the ribbons, water vapor evaporated from alumina sol during annealing in N<sub>2</sub> atmosphere causes surface crystallization and an increase in the iron loss of the ribbons. The surface crystallization and deterioration of magnetic properties have not been observed when the ribbons are annealed either in vacuum or in air.

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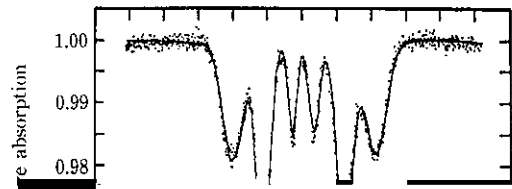
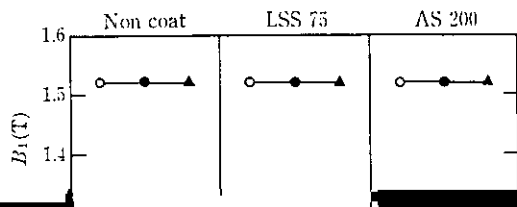


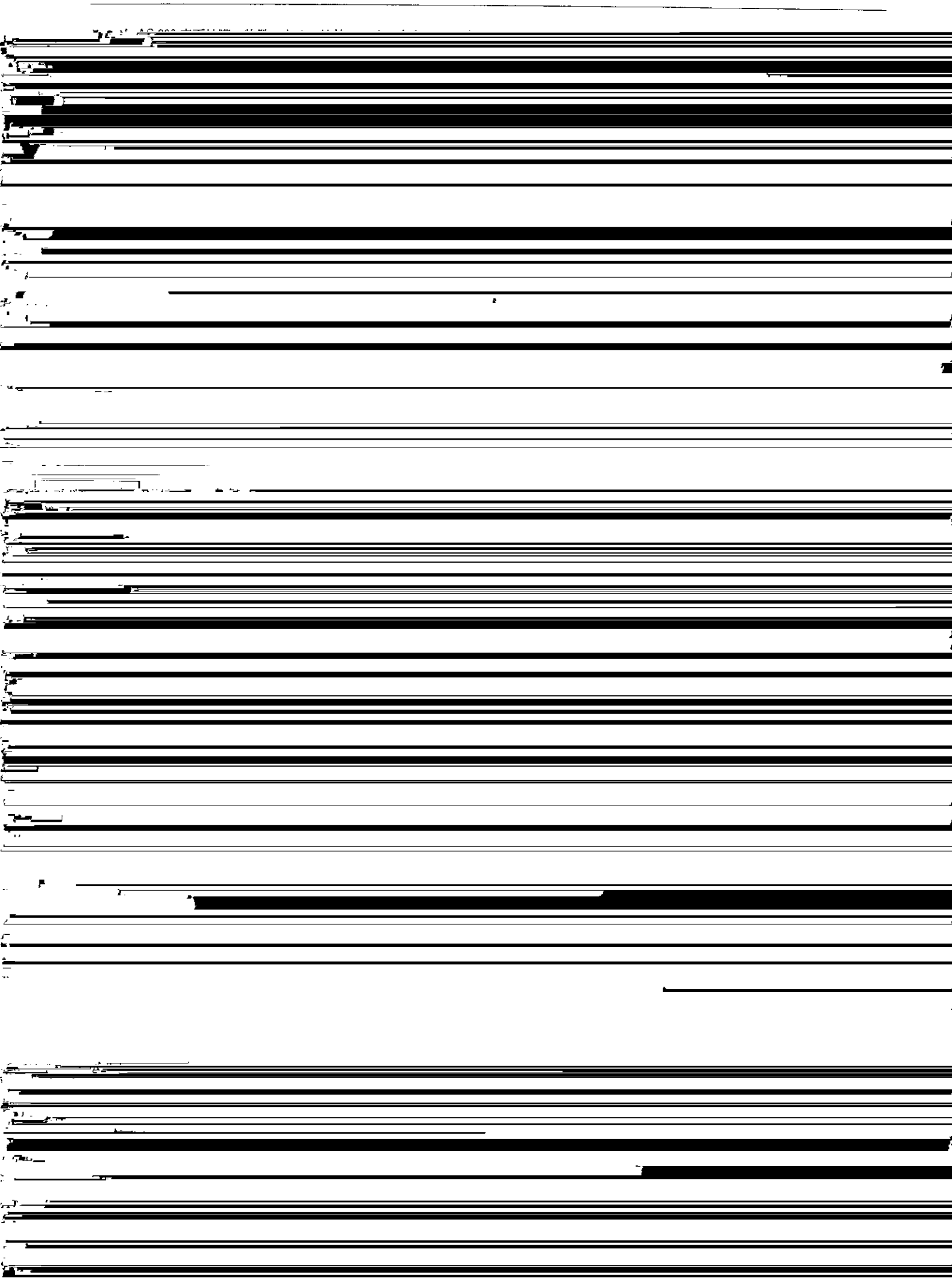
要旨

Fe-B-Si 系非晶質合金薄帯への絶縁抵抗と耐食性の付与を目的として、表面被膜の検討を行った。(1)  $\text{SiO}_2/\text{Li}_2\text{O}=3.5$  のリチウムシリケートのように薄帯に対して圧縮応力を付与する表面被膜は高い磁界まで恒透磁率を実現するが、鉄損を増加させるので変圧器鉄芯用には使えない。(2)  $\text{SiO}_2/\text{Li}_2\text{O}=7.5$  のリチウムシリケートは薄帯と機械的な相互作用を持たず磁気特性を劣化させないので、変圧器











酸化が生じて、表面結晶化に至る原因である。

### 3.4 変圧器用の非晶質合金薄帯に適した表面被膜

電力用変圧器の鉄芯に用いる非晶質合金の基本組成は、今後若干

## 4 結 論

Fe<sub>79.5</sub>B<sub>12</sub>Si<sub>9.5</sub> 非晶質合金薄帯の磁気特性におよぼす表面被膜の影

よび価格などの要因から Fe-B-Si 系に限定されることが考えられる。  
Fe-B-Si 系非晶質合金薄帯の磁歪は Fe 量に比例し、その値は鋼材

(1) リチウムシリケート-35 のように Fe-B-Si 系非晶質合金薄帯  
は圧縮応力場を形成して表面被膜は、薄帯内部の磁歪を