

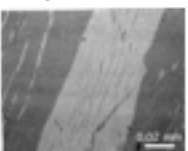
### The sign of iron-titanium segregation often characterizes lamellae

#### New finding:

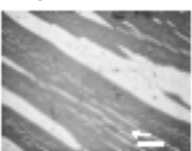
- for 60 Ti hematite bulk composition results TRM in Ti hematite but not in ilmenite lamellae
- Ti 60 bulk Ti hematite has CRH in both but not in ilmenite lamellae

### Hematite (bulk 0.12Ti) - Wilson Lake Ilmenite (bulk 0.70Ti) - Allard Lake

Wilson Lake  
LTM2; CRM1



Allard Lake  
CRM2; CRM1

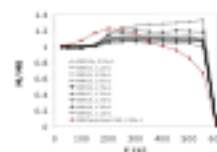


Ilmenite - reflected light  
Before and after etching

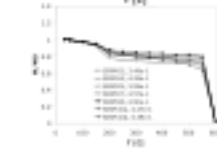


### Remanence demagnetization Hematite

HF remanence lamellar structure  
remains at TRM



QFM remanence lamellar structure  
remains at TRM



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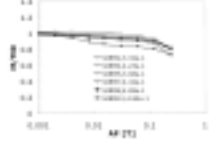
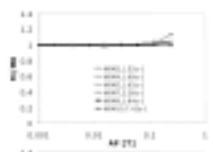
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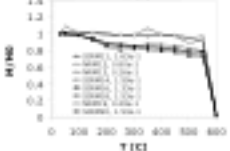
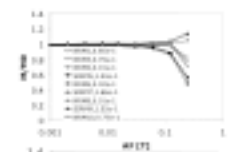
### Remanence AF demagnetization Hematite

HF remanence lamellar structure  
remains at TRM



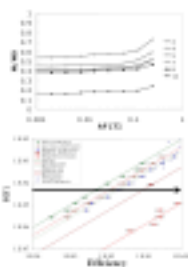
### Remanence AF demagnetization Ilmenite

HF remanence lamellar structure  
remains at TRM



### Ilmenite-hematite Efficiency of TRM

- $\chi$  (Curie)  $\sim 0.1$
- Small  $J_s \sim 2 \text{ kA/m}$
- Small demagnetizing field allows to align TRM/CRM
- Confirms empirical scaling law
- **Low  $J_s$  vs High  $J_s$  TRM/CRM**



Basu SP, Chou G, Singh D  
Some Phase Transitions in Fe<sub>2</sub>O<sub>3</sub> and Fe<sub>3</sub>O<sub>4</sub>

- The idea was to investigate possible charge ordering on Fe sites. That is a postulate of the 'lamellar magnetism hypothesis', but significant Fe<sup>2+</sup>-Fe<sup>3+</sup> ordering is not predicted.

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### Conclusions

- Remanence of Ti-hematite is due to small values of  $J_s$
- Larger Ti-hematite has stronger magnetization than ilmenite due to superparamagnetism
- Lamellar magnetism over ilmenite-hematite interface is not observed and it is not magnetically significant.

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