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1. Highlights in 2007

(1) Thermal conductivity measurements and prediction for metallurgical flux having CaO dispersion

To predict thermal conductivities for binary molten silicate flux with solid CaO dispersion, the applicability of a prediction equation that was previously used for composite materials has been investigated using polyethylene-silicon oil, alumina-paraffin and CaO-slag (CaO-3mass%SiO_2-37mass%Al_2O_3) systems as samples, thermal conductivities of the last being measured at 1743 K. It has been found that the equation can predict thermal conductivities of binary molten silicate flux with solid CaO dispersion from the values of thermal conductivities for component substances and the value of volume fraction of the dispersing substance.

(2) Emissivity measurements of molten Fe-C alloys

Emissivities of molten Fe-*x* mass%C (*x* = 0 - 4.85) have been determined at the respective liquidus temperatures and wavelengths between 500 - 2500 nm. Measurements on liquid Fe have also been made at temperatures between its melting point (1808 K) and 1970 K. The emissivity of liquid iron does not show temperature dependence within experimental uncertainty at any wavelength investigated, but the emissivities of all the samples decrease with increasing wavelength. The emissivities of the alloys at the liquidus temperatures increase slightly with increasing the C concentration up to 3.8 mass%, followed by steep increase in emissivity.

(3) Electric resistivity measurements of molten Ge-Sb-Te alloys

A new electric resistivity measurement method has been developed to measure on molten Ge-Sb-Te alloys that are used as materials for the phase change memory, in which method the measuring atmosphere can be controlled to keep the sample from oxidation. This method has been applied to molten Ga and Sn, and the electric resistivities obtained are in very good agreement with previously reported values in literature: the discrepancy is within ± 0.5 % for Ga and ± 1 % for Sn. The electric resistivities of molten Sb_2Te_3 and $Ge_2Sb_2Te_5$ display negative temperature coefficients in the temperature range between the liquidus temperatures and 1000 K.

2. Articles (original article, comment/book)

1. **Chemical state of fluorine in fluoroaluminosilicate slags in glassy and molten states from perspective of electronic polarisability:**
   S H Firoz, R Endo, M Susa, Ironmaking and Steelmaking, **34**(2007)437-433

2. **Thermal conductivity of CaO-SiO_2-Al_2O_3 glassy slags: Its dependence on molar ratios of Al_2O_3/CaO and SiO_2/Al_2O_3:**
   M Susa, M Watanabe, S Ozawa, R Endo, Ironmaking & Steelmaking, **34**(2007) 124-130

3. **Effects of alloying elements on density of states controlling colors of Cu based alloys:**
   M Sakaguchi, R Endo, M Susa, Journal of the JRICu, **46**(2007) pp. 186-191

4. **Thermal conductivity measurements and prediction for R_2O-CaO-SiO_2 (R = Li, Na, K) slags:**
   S Ozawa, R Endo, M Susa, Tetsu-to-Hagané, 93 (2007) 416-423

5. **A Reversible change of reflected light intensity between molten and solidified Ge-Sb-Te alloy:**
   M. Kuwahara, R Endo, M Susa, Japanese Journal of Applied Physics, **46** (2007) L868-L870

3. Presentation in international/domestic conferences

1. **Thermal conductivities of R_2O-CaO-SiO_2 (R=Li, Na, K) slag melts determined by hot wire method:**
   M. SUSA, S. OZAWA, R. ENDO, Proc of 11th China - Japan Symposium on Iron and Steel Technology (Okinawa, Japan) 2007, 80 – 87

4. Others

Nishiyama Commemorative Prize, The Iron and Steel Institute of Japan (2007)