IONIC CONDUCTIVITY ENHANCEMENT IN THE Li_2SO_4-$CaSO_4$ EUTECTIC MIXTURE DUE TO ADDITION OF Al_2O_3

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One possible approach to enhance the ionic conductivity of stable lithium salts at ambient temperatures is to make use of the "Composite Effect", where the interfacial conductivity in a multiphase system is expected to contribute to the conductivity enhancement. We have reported earlier that in the Li_2SO_4-$CaSO_4$ two phase system, the eutectic composition has the maximum conductivity [1,2]. Subsequently, we have observed that the conductivity can be further enhanced by adding fine Al_2O_3 powder to the above eutectic mixture. A maximum conductivity of $\sim 1.0 \times 10^{-6}$ ohm^{-1} cm^{-1} at 275 ^{o}C was observed when 40 mole % Al_2O_3 was added to the eutectic mixture. This is about an order of magnitude higher compared to the conductivity of 1.29×10^{-7} ohm^{-1} at 275 ^{o}C of the pure eutectic mixture. The conductivity of pure beta Li_2SO_4 at this temperature is 4.1×10^{-8} ohm^{-1} cm^{-1}. This enhancement in conductivity could be attributed to the increased interfacial conduction due to the presence Al_2O_3 grains.

References

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