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Sulphate based Solid Electrolytes and their Applications

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Sulphate based solid electrolytes can have ionic conductivity as high as $3^{-1}cm^{-1}$ as in the case of pure Li_2SO_4 at a temperature of 800 ^{0}C. By mixing one or more of other sulphates in correct proportions, highly conducting phases can be found at relatively low temperatures. The conductivity is due to the cation mobility, and in contrast to the solid electrolytes such as Balumina and Ag-I based systems both mono-and divalent cations are mobile. The high conductivity in the fcc Li2SO4 and in certain other sulphate systems are caused by an unusual transport mechanism called 'paddle wheel mechanism' in which the mobility of the cations is enhanced by a rotational motion of the transitionaly static, sulphate ions. Sulphate based solid electrolytes can be used in high energy density primary cells and in heat storage system.