

ON THE POSSIBILITY OF USING CLAY MINERALS AS

SOLID ELECTROLYTES

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Clay minerals are layered aluminosilicates, abundant in nature and hence a cheap natural resource. Any practical application of these materials therefore, offers considerable commercial potential. This presentation deals with the possible exploitation of clay minerals as solid electrolytes.

The clay minerals structure results from the condensation in various ratios of two types of hexagonal sheets. The first type is formed by corner sharing Si-O tetrahedra and the second by edge sharing octahedra. In the idealised structure the tetrahedral cation is $\text{Si}^{(4+)}$ and the octahedral ion is either Al^{3+} or Mg^{2+} . The different clay structures may be derived by considering the number of tetrahedral and octahedral sheets condensing to form a layer, and the variety of isomorphous substitutions that may occur.

Isomorphous substitution by cations with lower valencies, leads to a charge imbalance in the layer and this gives the clays the important property of cation exchange. Thus the space between layers (interlayer space) is occupied by hydrated

charge balancing exchangeable cations. These cations are mobile in an electric field and it is this mobility that one hopes to use when the clay is employed as a solid electrolyte.

This presentation will briefly discuss the use of clay minerals such as montmorillonite as chemically inert but membrane like coatings on electrodes and the possible use of these materials as solid electrolytes in the design of batteries. The potential shown by these materials as high temperature ionic conductors will also be discussed.