Effective transport parameters for $LiFePO_4$ cathodes for Li-ion batteries.

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$LiFePO_4$ as cathode material for Li-ion batteries, has been extensively studied. The main focus has been the determination of charge and mass transport and their influence on the battery specific capacity and rate capability. For instance, although the values for Li^+ diffusion coefficient found in the literature have related material properties with the battery properties, today there is still much uncertainty in the reported values due to the different methodologies and variables influencing battery performance, even under similar conditions [1-3].

On the other hand, recently, the composition of the cathode slurry has been reported to influence battery performance and rate capability, the best behavior, using $LiFePO_4$ without modifications, was obtained with a composition 86-7-7(Active material-Carbon-Binder) [4]. Therefore, in order to understand the battery behaviour, the present work focuses on the correlation of Li^+ diffusion coefficients cathode with composition and operation conditions (C-rate and state of discharge). The dependence of $LiFePO_4$ cathodes rate capability as a function of the active material concentration and additives shows a very important influence on the charge transfer and transport mechanism influencing in the intercalation/deintercalation of Li^+ ions diffusion coefficient very significantly. Thus, the transport parameters are not an intrinsic of $LiFePO_4$, but effective parameters taking into account all the cathode properties.

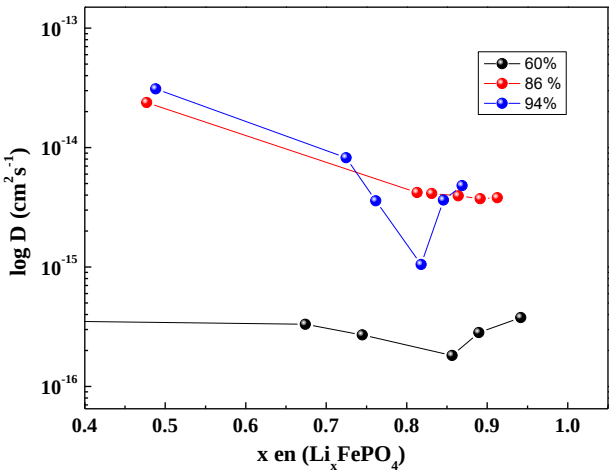

Figure 1. Effective diffusion coefficient calculated for $LiFePO_4$ cathodes to different composition as a function of the fractions of Li^+ intercalated during discharge process.

References:

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