BFB10

Lithium Transport through $Li_{1-\delta}Mn_2O_4$ Electrode : Analysis of Current Transient using Monte Carlo Simulation

$Li_{1-\delta}Mn_2O_4$ 전극내의 리튬 이동 : 몬테 카를로 시뮬레이션을 이용한 전류 추이 곡선의 해석

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Lithium transport through $Li_{1-\delta}Mn_2O_4$ electrode during the lithium intercalation involving the disorder to order phase transition was investigated by analysing the potentiostatic current transient with the aid of Monte Carlo simulation. All the measured current transients showed non-Cottrell behaviour during the whole lithium intercalation, and the relationship between the initial current level and the applied potential drop followed Ohm's law. Using the Monte Carlo simulation for the repulsive ionic species in the cubic lattice based upon a lattice gas model, the current transients were theoretically obtained at various applied potential steps under the impermeable boundary and 'cell-impedance controlled' constraints. Both current transients experimentally measured and theoretically calculated which coincided well with each other showed two 'quasi-current plateaux' separated by a steep current drop in value, indicating the coexistence of the disordered and ordered phases within the electrode. From the results, it was suggested that lithium transport through the $Li_{1-\delta}Mn_2O_4$ electrode is governed by the 'cell-impedance controlled' constraint during the whole lithium intercalation involving the disorder to order phase transition.

References

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