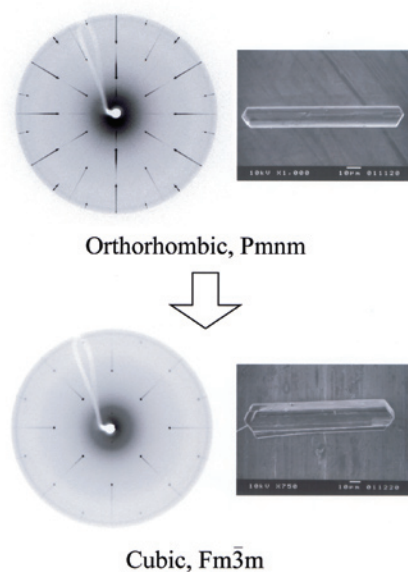


## Synthesis of a Novel Disordered Rocksalt-Type Manganese Dioxide

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AIST Today Vol. 3, No. 7  
(2003) 14

Layered lithium manganese oxides have attracted intense research interest as prospective cathode materials in secondary lithium batteries not only because of the low cost and low toxicity of manganese, but also because of their high theoretical capacities. Recently, we have succeeded in the synthesis of the electrochemically delithiated  $\text{Li}_x\text{MnO}_2$  crystals with  $x < 0.1$  from the parent orthorhombic  $\text{LiMnO}_2$  single crystals. We also revealed the disordered rocksalt-type structure by single-crystal X-ray diffraction method. The mechanism of the structural transformation from the parent  $\text{LiMnO}_2$  to the rocksalt-type  $\text{MnO}_2$  was well explained by the manganese ion migration accompanied with  $\text{Li}^+$  extraction. We believe that the rocksalt structure is a key to understanding the good and stable characteristics of the charge-discharge cycles in the  $\text{LiMnO}_2$  electrodes for the battery use.



Single-crystal X-ray diffraction patterns of the parent  $\text{LiMnO}_2$  and the delithiated  $\text{MnO}_2$

## DME Fueled Courtesy Bus

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AIST Today Vol. 3, No. 7  
(2003) 15

Figure shows DME powered mini-bus with a wheelchair lift. This vehicle represents the outcome of several projects, such as “Research and Development of Retrofit DME Diesel Vehicle”. The major areas modified include (1) Changing seal materials for DME compatibility, (2) Use of a pressure resistant fuel supply system, (3) Injection pump cooling system with fuel circulation, (4) Post-shutdown fuel purge system, (5) Use of a suitable lubricant additives with the DME fuel. With a fully-developed retrofit system, the cost is expected to be reduced, and it may be installed on in-use vehicles. This mini-bus will be licensed and operated in the near future.



DME powered mini-bus with wheelchair lift