



# 應用科學研究中心

## Research Center for Applied Sciences



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### **Development of Post Lithium Ion Battery - Sodium-ion batteries**

**Date: 2017.03.20 (Mon)**

**Time: 11:00-12:00**

**Venue: B106 Auditorium, 1F, IRBST,  
Academia Sinica**

**跨領域科技研究大樓 1F B106 演講廳**

**Host: Din Ping Tsai 蔡定平主任**

# Development of Post Lithium Ion Battery

## - Sodium-ion batteries

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Sodium-ion batteries are a promising candidate for large-scale energy storage due to the low cost and rich resources of sodium. However, there are some critical drawbacks limiting its application, such as safety and cycling stability issues. Many efforts have been made in search for high-performance electrode materials for sodium storage. Among them, layered sodium oxide  $\text{Na}_x\text{MeO}_2$  (where Me is 3d transition-metal) has always been a hot research topic owing to its large specific capacity and reversible insertion/extraction. We have developed a series of  $\text{Na}_x\text{MeO}_2$  polytypes with O3, P2 and P3 stackings, including titanium-based and manganese-based oxides, and systematically investigated the relationship of crystal structure and electrochemical performance. We found that titanium cooperation in layered oxides could not only smooth potential profiles via suppressing complex phase transitions in cathode side, but also deliver a 0.7V sodium-storage plateau in anode side, thereby demonstrating a new concept of “symmetric sodium cells” with long-standing life and high safety. We also proposed an atomic-engineering P2@O3 manganese-based oxide composite via biphasic synergy effect for high-energy cathodes. These results highlight the significance of materials structure for sodium storage performance and moreover promote the development of room-temperature sodium-ion batteries towards practical applications.