

## 리튬 이온 커패시터에서 마이크로파 조사에 의한 팽창 흑연의 전기화학적 특성

## Electrochemical Characteristics of Expanded Graphite by Microwave Irradiation in Lithium Ion Battery

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**Abstract** : Graphite is used as a negative electrode active material of Lithium ion capacitor (LIC). At the cathod, electrostatic reaction of EDLC is a very high reaction rate compared to a oxidation-reduction reaction. When the graphite was expanded that the length between the sheet, the intercalation of lithium ions is smoothed. And thus, the power density increases. By measuring the XRD, it was confirmed that the increase in interlayer spacing of graphite. And by measuring an electrochemical reaction in Lithium Ion Battery (LIB), it was confirmed the tendency of power density is improved.

## 1. Introduction

LIB is member of rechargeable battery types. Electric current is generated when lithium ions migrate from the negative electrode to the positive electrode through the electrolyte during discharge. Graphite is a material in which carbon atoms thermal conductivity coupled to one another in the plane of the hexagonal plane, one covalently very strong interlayer to form weak vander Waals bonding. Graphite has been used dominant negative electrode materials in LIB. Lithium ions are inserted between the graphite layers, will be eliminated. In this case, lithium ions by microwave irradiation to allow for easy insertion and desorption between the layers of graphite, and an experiment was performed to widen the spacing between the layers.

## 2. Main subject

Graphite was subjected to chemical oxidation. Natural graphite (NG) flakes of size  $\sim 2\mu\text{m}$  are were acid treated with sulfuric acid and concentrated nitric acid in a volume ratio 3:1 to form Graphite oxide(GO). And then the acid treated graphite was irradiated by microwave for 10s, 20s and 30. Microwave irradiation technique process of the material production is simple, very fast and cost effective, and the material is light weight and large surface area.

## 3. Conclusion

The physical properties of the EGs, was examine by reference scanning electron microscopy (SEM). The length between the sheet of EG has been examined using X-ray diffraction (XRD). And we measured with cyclic voltammetry (CV), Impedance and Charge/Discharge test to analysis electrochemical properties of EGs.

Fig. 1 is impedance graph of expanded graphite. Microwave irradiation for 30s is lower than natural graphite.

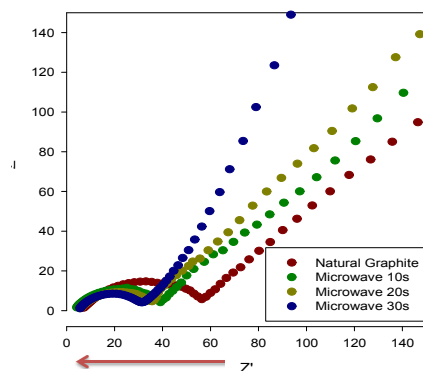


Fig. 1. Impedance of Expanded Graphite by Microwave. Frequency 0.01Hz~100KHz. Amplitude 10mV. At 2.8V

## References

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