웨이브렛 변환을 이용한 태양광 발전시스템의 power quality 측정에 관한 연구

*김 일송

The study on the power quality measurement using wavelet transform in the grid-connected photovoltaic system

*il-song kim

본 논문에서는 wavelet 변환을 이용하여 태양광 발전 시스템의 계통 전원 고조파를 측정하는 방법을 연구하였다. PCS(Power Conditioning System)는 태양전지의 전력을 교류로 변환하여 계통에 연계시키는 장치이다. 직류에서 교류로 변환할 때 스위칭 노이즈가 발생하고, 전력품질이 약화되게 된다. Wavelet 이론은 시간 파형을 주파수 성분으로 분해할 수 있는 기술이다. 이중에서 MLD(Multi- evel Decomposition)기법은, 계산량이 적으면서도 빠른 시간 내에 고조파 성분들을 알아낼 수 있다. 시스템 모델링과 wavelet 이론 소개, 그리고 컴퓨터 모의실험과 DSP 제어기를 이용한 실험 결과로서 본 연구의 타당성을 입증하였다.

Key words : power quality, wavelet transform, PCS, photovoltaic system

E-mail : * iskim@cjnu.ac.kr

Advances in Li-ion Batteries

*Se-Hee Lee

Efficient and durable electrical energy storage is one of the major factors limiting the wide-spread adoption of renewable energy. Since lithium-ion batteries (LIBs) were first commercialized in the early 1990s, LIBs have emerged as an important energy storage device for portable electronics. LIBs are very desirable because of their high energy storage per volume and per mass. However, LIBs with high energy and power as well as higher stability are needed for their use in a variety of energy storage applications such as MEMS devices, PDA, plug-in hybrids, all-electric vehicles and large scale utility systems. In this talk, I will discuss present energy perspective, especially energy storage and its role in renewable energy. After that I will discuss the recent advances in nanostructured materials and interface engineering that have led to the achievement of improved Li-ion batteries. Finally I will talk aboutcritical issues that need to be addressed to obtain further improvements in Li-ion batteries.

E-mail : * sehee.lee@colorado.edu

Room Temperature Hydrogen Sensor

*.**Hyoung Jin Cho, Peng Zhang, Sudipta Seal

Due to the recent public awareness of global warming and sustainable economic growth, there has been a growing interest in alternative clean energy sources. Hydrogen is considered as a clean fuel for the next generation. One of the technical challenges related to the use of hydrogen is safe monitoring of the hydrogen leak during separation, purification and transportation. For detecting various gases, chemiresistor-type gas sensors have been widely studied and used due to their well-established detection scheme and low cost. However, it is known that many of them have the limited sensitivity and slow response time, when used at low temperature conditions. In our work, a sensor based on Schottky barriers at the electrode/sensing material interface showed promising results that can be utilized for developing fast and highly sensitive gas sensors. Our hydrogen sensor was designed and fabricated based on indium oxide (In2O3)-doped tin oxide (SnO2) semiconductor nanoparticles with platinum (Pt) nanoclusters in combination with interdigitated electrodes. The sensor showed the sensitivity as high as 10^7% (Rair/Rgas) and the detection limit as low as 30 ppm. The sensor characteristics could be obtained via optimized materials synthesis route and sensor electrode design. Not only the contribution of electrical resistance from the film itself but also the interfacial effect was identified as an important factor that contribute significantly to the overall sensor characteristics. This promises the applicability of the developed sensor for monitoring hydrogen leak at room temperature.

Key words : Hydrogen, Gas Sensor, Chemiresistor, Nanoparticle, MEMS

E-mail : *.** joecho@mail.ucf.edu, hjcho@skku.edu