

Park, Hye-Yun

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- Qualification**
- In-depth knowledge in from materials to applications based on the theoretical and experimental study
 - Readily accessible to diverse fields
 - Multi-tasking performance in efficiently & effectively managing projects
 - Well-adaptability with integrity and positive mind
 - English writing/ reading/ speaking with fluency
- Research Experiences**
- **Organic solar cells (OSCs)**
 - Design and set-up of the device fabrication system
 - Fabrication of OSCs by various solution processes
 - Development of electrostatic and gas-assisted spray technic for photoactive layers (PLs) and electron transporting layers (ETLs)
 - Study on various external treatments to develop and manipulate nano morphology of PLs and ETLs
 - Investigation on effects of internal and surface morphology of PLs and ETLs on charge generation and transportation
 - **Organic thin film transistors (OTFTs)**
 - Photolithography and semiconductor fabrication processes
 - Development of spray technic to fabricate active layers for high performance OTFTs
 - Control of the molecular orientation for active layer by the external solvent treatment
 - Study on effects of molecular ordering such as orientation and crystallization on the charge mobility
 - **Quantum dots solar cells (QDSCs)**
 - Development of spray and spin coating method to deposit high quality QDs layers for high performance QDSCs
 - Improvement of QDs thin films topology by the external solvent treatment
 - Layer-by-layer method using spin and spray method
 - Investigation on the relationship between ligands of the QDs and electrical property for the QDSCs
 - **QDs and polymer composite for OSCs and light emitting diodes (LEDs) converter**
 - Fabrication of high performance OSCs and LEDs phosphor films by spin casting and spray method
 - Development of solution process to deposit high quality thin films based on QDs and polymer composite
 - Modification of optical property by developing surface roughness of sprayed QDs and polymer composite thin films
 - Study on the charge transfer and recombination of sprayed QDs and polymer thin films

- **Ultra-thin super-capacitor based on the metal oxide nano particles**
 - Achievement of solution process to deposit high quality thin film by spray method
 - Development of suitable nano structure for solution process
 - Fabrication of high transparent and flexible super-capacitor
- **Analysis equipment in research**
 - Specialized in operation and analysis of X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), atomic force microscopy (AFM), scanning electron microscope (SEM), and UV-Vis spectroscopy
 - Effective operation of Raman scattering spectroscopy, incident photon to charge carrier efficiency (IPCE) measurement instrument, and electrical property measuring instrument
 - Preparation of samples and analysis of results for transmission electron microscope (TEM) fluently
 - Operation of impedance spectroscopy and cyclic voltammetry
 - Performed small angle neutron scattering (SANS) and synchrotron grazing incident X-ray diffraction (GIXRD)
 - User education tutorial of synchrotron radiation in Pohang accelerator laboratory in Korea
- **Others**
 - Enthusiastically developing various solution processes such as spin casting, electrostatic and gas-assisted spray deposition, dip coating, and layer by layer for organic electronics
 - Synthesis of various nanostructures including inorganic and organic materials; lead sulfide quantum dots, graphene, and graphene metal composite by chemical method
 - Experience on other solar cells such as CIGS and DSSCs
 - Abundant working and maintaining experiences of vacuum deposition system; sputtering and thermal evaporator

Education

Sep. 2009 ~ Aug. 2013

Korea Advanced Institute of Science and Technology (KAIST)
Materials Science and Engineering

Doctor of philosophy (prospective graduate on Aug. 2013)

Advisor : Prof. Si-Kyung Choi

Thesis Title : A Morphology Study on Sprayed Thin Films for High Performance and Air-stable Organic Solar cells

Feb. 2008 ~ Aug. 2009

Korea Advanced Institute of Science and Technology (KAIST)
Materials Science and Engineering

Master of science (the early graduation of excellent students)

Advisor : Prof. Si-Kyung Choi

Thesis Title : Fabrication of Graphene and Carbon Nano Structures by Thermoelectrical Pulse Induced Evaporation Method

Mar. 1999 ~ Feb. 2003

Korea Maritime University (KMU)

Marine system engineering (with completed a course in teacher education)

Bachelor of science

Job Experiences **Apr. 2003 ~ Oct. 2006**
Boarding ship as an engineer in Korea Special Shipping
- Maintenances and management service for various essential auxiliaries machinery, deck machinery, and main engine for 4 years.

Honors and Scholarship **2008. 09 ~ 2009. 09** Honors engineering scholarships by Korea Student Aid of Foundation
2008.02 ~ present National fellowship, KAIST, Korea
2005. 10 Outstanding employee awards by Korea Special Shipping
2001.09 ~ 2003. 02 Scholarship for excellent grade student, KMU, Korea

Project **2012. 09 ~ present** “Development of new materials for high efficiency solid-state dye-sensitized solar cells possessing long-term high temperature stability”
2012. 03 ~ present “Control of Energy Level of Hybrids Materials Using γ -ray”
2012. 05 ~ 2013. 04 “Fabrication of highly stable organic thin film solar cells using vacuum free low temperature process”
2010. 03 ~ 2011. 02 “Development of full-sepectrum high efficiency organic photovoltaics”
2010. 03 ~ 2010. 12 “Development of quasi-solid dye-sensitized solar cells”
2010. 03 ~ 2010. 12 “Technology of controlling thermoelectrical property of molecule-metal nanohybrid for developing materials of high efficiency molecule thermoelectrics”
2010. 03 ~ present “Development of photoelectrochemical cell with using organic-inorganic hybrid tandem solar cell”
2010. 03 ~ 2011. 02 “Synthesis of conjugated oligomers for organic optoelectronic devices”
2010. 03 ~ 2011. 05 “Development of cheap carbon fibers”
2008. 02 ~ 2008. 12 “Nano-ferroelectric devices by low temperature self-assembly and their fusion to IT-BT”

Title of Course First-principles Modeling of Materials
Introduction to Semiconductor Device
Electron Microscopy
Nano Technology
Nanoscale Surface Analysis
Dielectric Materials
Semiconductor Process Design
Plastic Electronic Materials and Devices
Science Writing in English
Special Topics in Advanced Materials
Organic Semiconductor Devices
M.S and Ph. D GPA : 3.92/4.3

- Themes in progress**
- High transparent and flexible ultra-thin films for pseudo super-capacitors by spray technique
: Development of various nanoparticles suitable for solution based thin-film process
 - The physics of charge generation, recombination and transport in solar cells
: Investigation on the decay and transport phenomenon in solar cells using electrochemical analysis such as IMVS and EIS.
 - The morphology study on bi-component film for organic solar cells by small angle neutron scattering analysis.
: Analysis on phase segregation in mixture films
 - The effect of γ -ray irradiation on sol-gel derived ZnO for n-type material of solar cells.

- Research Papers**
- [1] **Hye-Yun Park**, Jinhyun Kim, Ilhwan Ryu, Sanggyu Yim, Sung-Yeon, Jang*, “Full sprayed high performance depleted quantum dot solar cell” (*writing in progress*)
 - [2] **Hye-Yun, Park**, Sung Pyo Hong, Young Rag Do*, Sung-Yeon, Jang*, “Wafer scale AgIn₅S₈/ZnS-alloyed NCs-polymer composite free standing films by a spray coating process and their applications for white-LEDs” (*writing in progress*)
 - [3] **Hye-Yun Park**, and Sung-Yeon Jang*, “Sol-gel derived ZnO for n-type materials of high performance PbS quantum dot solar cells ” (*writing in progress*)
 - [4] **Hye-Yun Park**, and Sung-Yeon Jang*, “Morphology control of gas-assisted spray coated electron-transport and active layers for inverted plastic solar cell” (*writing in progress*)
 - [5] **Hye-Yun Park**, Kwang-Dae Kim, Dongchan Lim, Sung-Yeon Jang*, “Performance optimization of low-temperature annealed solution-processable ZnO buffer layers for inverted polymer solar cells”, *Journal of Materials Chemistry*, **2013**, 1, 6327-6334
 - [6] **Hye-Yun Park**, Jun-Su Jin, Sanggyu Yim, Seung-Hwan Oh, Phil-Hyun Kang, Si-Kyung Choi, Sung-Yeon Jang*, “Effects of surface characteristics of dielectric layers on polymer thin-film transistors by spray methods”, *Physical Chemistry Chemical Physics*, **2013**, 15, 3718-3724
 - [7] **Hye-Yun Park**, Hoichang Yang, Si-Kyung Choi, and Sung-Yeon Jang*, “Efficient solvent-assisted post-treatment for molecular rearrangement of sprayed polymer field-effect transistors”, *ACS Applied Materials and Interfaces*, **2012**, 4, 214–221
 - [8] **Hye-Yun Park**, Kyungkon Kim, Dong Young Kim, Si-Kyung Choi, Seong Mu Jo and Sung-Yeon Jang*, “Facile external treatment for efficient nanoscale morphology control of polymer solar cells using a gas-assisted spray method”, *Journal of Materials Chemistry*, **2011**, 21, 4457-4464