

1. 본인 이름 하이라이트(ALPDF 하이라이트 기능 활용 또는 형광펜으로 표시)
- 공동주저자인 경우 논문 첫 장 또는 뒷부분에 있는 “equally contributed” 문장도 하이라이트
 - “equally contributed” 문장이 논문 뒷부분에 있는 경우, 하이라이트 후 논문 본문 전체 파일(PDF)을 제출

RESEARCH ARTICLE

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Decoupling the Capacity Fading in Ni-Rich Layered Materials during High-Temperature Cycling in the Full-Cell System

Minji Kim, Wontae Lee, Eunkang Lee, Jaeyoung Kim, Jae-Uk Kim, Seongeun Lee, Sunhyun Hwang, Dohyung Park, Kwanghwan Cho, and Won-Sub Yoon*

The performance of commercial lithium-ion batteries (LIBs) tends to degrade over time owing to the deterioration of key components, including cathode, anode, and electrolyte. To enhance performance, it is crucial to gain insights into the actual deterioration state of each element. Here, the high-temperature deterioration of a Ni-rich layered cathode is investigated, which is widely used in electric vehicles. In the refresh process after a prolonged cycle, a significant recovery of the lattice structure predominantly occurs in the discharge region. This pseudo-deterioration of the Ni-rich cathode within the full-cell system is mainly due to the consumption of the Li-ion forming the solid electrolyte interphase layer at the graphite anode during the cycle. Moreover, irreversible deteriorations that are not restored through the refresh process are observed in both charge and discharge regions. Structure analyses reveal that the long-term cycling at the high temperature leads to a mixed fading of charge and discharge via various deterioration such as the formation of NiO-like rock salt phase on the cathode surface and increased cation disorder in the bulk. These findings deepen the understanding of the deterioration behavior of Ni-rich cathodes in full-cell systems, providing insights for enhancing the performance of high-temperature cycling.

1. Introduction

Today, LIBs have rapidly expanded in various applications ranging from mobile devices to the automotive industry. Accordingly, to meet the significant increase in the complicated market demand for the performance of LIBs, there is a need to develop electrode materials for LIBs with higher energy densities using low-cost and non-toxic elements while maintaining long-term cycle performance.^[1-3] Under these sustained pressures, Ni-rich layered oxide cathodes have become one of the promising cathode materials for LIB systems, and Ni-rich layered materials are commonly used as cathodes coupled with graphite anodes.^[4-6] However, the full-cell with the above electrode materials has not secured enough cycle performance to satisfy sophisticated and demanding consumers.^[8-15] In general, the capacity fading of Ni-rich||graphite full-cell is due to various deteriorations that occur on both the cathode and anode. For example, capacity fading occurs at the cathode due to factors such as crystal orientation,^[16-18] calcination process during synthesizing,^[19-22] long-range cation disorder,^[23] radial ordered arrangement of primary particles,^[24,25] structural reconstruction to NiO-like rock-salt phase on the surface,^[26,27] transition metal (TMs) dissolution,^[28] state-of-charge (SOC) heterogeneity,^[29-31] microcrack generation,^[32,33] and pulverization of bulk particles. In addition, the growth of the solid electrolyte interphase (SEI) layer,^[33-36] which consumes available Li inventory (ALI) and dissolved TMs on the anode surface, affects the capacity fading of full-cell after extensive cycling. Furthermore, the deposition of excessive metallic Li and dendrite formation on anode surfaces can bring the risk of internal short circuits and fire hazards.^[36-41] These fading mechanisms are accelerated when the batteries are exposed to high-temperature conditions and impact the safety and sustainability of batteries. For example, high temperatures (e.g., 45 and 65 °C) caused significant increases in internal resistances (R_b , R_{ct} , R_{SEI}) of the Ni-rich||graphite-SiO₂ full-cell system compared to room temperature (RT, 25 °C), exhibiting poor cycle and rate performances.^[42] For this phenomenon, it was explained that high temperatures led to structural deterioration of the graphite anode, resulting in capacity loss. One interesting point is that the decreased ALI of Ni-rich in the full-cell can be recovered to a large extent when the cycled Ni-rich is charged and discharged again in the Li half-cell. In addition, the high-temperature and upper cut-off voltage can affect the severe capacity loss by increased amounts of TM dissolution from cathode materials.^[12] Extensive studies on the high-temperature cycle performance of full-cells based on Ni-rich

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2. 이름 및 소속(성균관대학교 에너지과학과) 하이라이트
- 소속이 논문 첫 장이 아닌 뒷부분에 있는 경우, 하이라이트 후 논문 본문 전체 파일(PDF)을 제출
 - 위 예시와 같이 모든 정보가 첫 장에 있을 경우, 첫 장만 제출

1. 학회책자 커버 복사 또는 홈페이지 첫 화면 캡처

2. 초록 또는 포스터 첨부



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Negative differential conductance in an atomically designed oxide superlattice

Hyeonbeom Kim, Seung Gyo Jeong, Seong Ju Hong, Woo Seok Choi, and Dongseok Suh

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³Division of Science Education, Kangwon National University, Gangwon-do 243 341, Republic of Korea

Motivation

- Superlattices: Periodic structure of layers, Low dimensional structure, Strong correlation with each layers, Structure engineering
- Quantum well [QW] sate in superlattices: Discrete state of metal layers, Negative differential resistance [NDR]
- Resonant tunneling current in QW state: Metal layers is quantized in insulator barriers, As bias increase, quantized state shifts to E_1 , Conduction maximum occurs when E_1 align with each state, Current drops at higher voltage due to the absence of state.
- NDR in various oxide materials: NDR in oxide materials with huge hysteresis, Oxygen vacancy, defect state, Joule heating, etc., Related with the state of the samples
- Proper set up for oxide SLs: Origin of hysteresis, Hysteresis free

Sample preparation

- 4 kind of sample with difference STO thickness
- Focused ion beam (FIB) method
- Pulse I-V sweep set up: Remove Joule heating during the measurement, Remove hysteresis from Joule heating

Experimental Result

- [614] sample shows the Resonant tunneling current with no hysteresis both DC and pulse (200 ms width).
- Peak to valley ratio of Pulse (200 ms) is higher than DC due to the suppression of thermal effect during the measurement.
- [618] sample shows resonant tunneling current with hysteresis but suddenly sample is changed by the induced oxygen immigration
- Via time resolved pulse I-V sweep method, we can symmetrically analysis voltage fluctuation induced by oxygen vacancy immigration.

3. 학회 프로그램 중 본인 발표 부분이 포함되어 있는 페이지 복사 또는 캡처▶ 모든 글씨가 선명하게 보이도록 캡처~!

Final Program July 2022

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본인 구두 또는 포스터 발표 표시

→

한국 포함 2개국 이상 참여 표시

→

5개 기관 이상 참여 표시

5:00 PM - 7:00 PM

Hawai'i Convention Center, Level 1, Kamehameha Exhibit Hall 2 & 3

NM04.10.03
High-Sensitivity and Ultra-Fast Recovery H2 Sensing Using Suspended Graphene-PEDOT:PSS:PEO Nanofiber Channels Abiral Regmi, Noori Na and Jiyoung Chang The University of Utah, United States

NM04.10.05
Systematically Analysis of Magneto and Vertical Transport of SrRuO₃/SrTiO₃ Superlattices Hyeonbeom Kim^{1,2}, Seung Gyo Jeong¹, Sung Ju Hong³, Dongseok Suh¹ and Woo Seok Choi¹; ¹Sungkyunkwan University, Korea (the Republic of); ²Center for Integrated Nanotechnologies, Korea (the Republic of); ³Kangwon National University, Korea (the Republic of)

NM04.10.09
Physical Possibilities and Limits of DNA-Enabled Programmable 2D Self-Assembly Nicholas Tjahjono, Evgeni S. Penev and Boris I. Yakobson; Rice University, United States

SESSION NM04.11: Low Dimensional Nanostructures II
Session Chairs: Seunghyun Baik, Vivek Saraswat and Ming Xu
Thursday Morning, May 12, 2022
Hawai'i Convention Center, Level 3, 301A

8:30 AM NM04.11.02
Oil-Free Compact X-Ray Generator Based on Carbon Nanotube Field Emission Shamim Rezaei, Soomin Lim¹, Jinho Choi¹, Amar P. Gupta¹, Jeakyu Jang², Seung Bum Ryu³, Kyung-Sik Yoon¹, Seung Jin Park¹ and Donghyun Song¹; Kyung Hee University, Korea (the Republic of); ²CAT Beam Tech. Co. Ltd., Korea (the Republic of); ³DEXCOWIN Co. Ltd. Korea (the Republic of)

8:45 AM NM04.11.03
Charge Transport Properties of Synthesized One-Dimensional Molybdenum Chalcogenides Jessica Ortiz Rodriguez, Joseph Perryman and Jesus Velazquez University of California, Davis, United States

9:00 AM NM04.11.04
Laser-Treated Triangular Single-Crystal Nanowire Synthesis Jakub Wawrzyniak¹, Jakub Karczewski², Emilian Gajda³, Krzysztof Gonska¹ and Katarzyna Siuzdak Institute of Fluid-Flow Machinery, Poland; ²Gdansk University of Technology, Poland; Adam Mickiewicz University, Poland

9:15 AM *NM04.11.05
Wafer-Scale Single-Crystal Film Growth of 2D Layered Materials and Heterostructures Young Hee Lee^{1,2}; ¹Sungkyunkwan University, Korea (the Republic of); ²IBS Center for Integrated Nanostructure Physics, Korea (the Republic of)

4. 30개 이상의 구두/포스터 발표가 진행된 학회임을 증명(1)▶ 모든 글씨가 선명하게 보이도록 캡처~!

Final Program July 2022	
1:45 PM NM04.02.05	Synthesis of Templating Hexagonal Boron Nitride on (Non-)Catalytic Substrates for Electronic Devices <u>Anja Sutorius</u> , René Weifling, Michael Wilhelm and Sanjay Mathur; University of Cologne, Germany
2:30 PM NM04.02.06	Quantifying (n,m) Specific SWCNT Partition Conditions in Aqueous Two-Polymer Phase Extraction Christopher Sims and <u>Jeffrey Eagan</u> ; National Institute of Standards and Technology, United States
2:30 PM BREAK	
2:45 PM NM04.02.07	Improving Geometric Uniformity of Carbon Nanotube Forests by Tuning Catalyst Formation Step in Dynamic Chemical Vapor Deposition Golnaz Najaf Tomaraci ¹ , Jaegun Lee ^{1,2} , Mostaf Abdulhafiz ³ and <u>Mostafa Bedewy</u> ¹ ; ¹ University of Pittsburgh, United States; ² Pusan National University, Korea (the Republic of)
3:00 PM NM04.10.02	Sulfur Encapsulated in Microporous Carbon Composites for Improved Hydrogen Storage <u>Charles D. Brewster</u> , Sebastien Rochat, Lui Terry and Valeska Ting; University of Bristol, United Kingdom
3:15 PM NM04.10.01	Carbon Nanotube Chemiresistors Coated with Hygroscopic Aqueous Film for the Selective Detection of Hydrolysable Toxic Compounds <u>SeongWoo Lee</u> and Chang Young Lee; Ulsan National Institute of Science and Technology, Korea (the Republic of)
SESSION NM04.03: Poster Session I: Nanotubes and Related Low-Dimensional Nanostructures I Session Chairs: Alister Page and Ming Xu Monday Afternoon, May 9, 2022 5:00 PM - 7:00 PM Hawai'i Convention Center, Level 1, Kamehameha Exhibit Hall 2 & 3	
NM04.03.01	Copper Nanowires Covered with Lattice-Rearranged 2D Materials for Flexible Transparent Electronics <u>Jongyeon Kim</u> and Youngu Lee; Daegu Gyeongbuk Institute of Science and Technology, Korea (the Republic of)
NM04.03.03	Highly Conductive Direct-write Electrospun PEDOT: PSS Nanofibers <u>Noori Na</u> , Abiral Regmi and Jiyoung Chang; University of Utah, United States
NM04.03.04	Thermal Stability of Pool Boiling Heat Transfer on Vertical Nanowire Surfaces Under Heater Size Effect <u>Maroosol Yun</u> ¹ , Wei-Ting Hsu ¹ , Injoong Chang ¹ , Juyoung Nam ¹ , Donghui Lee ² , Beom Seok Kim ³ and Hyung Hee Cho ¹ ; ¹ Yonsei University, Korea (the Republic of); ² Chonbuk National University, Korea (the Republic of); ³ Seoul National University of Science and Technology, Korea (the Republic of)
NM04.03.05	Engineered Vertically-Aligned CNT for Plasmon-Enhanced Optical Sensing with Programmable Molecular Delivery <u>Seong Jae Kim</u> , Ji-Hun Jeong, Sukkyung Kang and Sanha Kim; KAIST, Korea (the Republic of)
NM04.03.06	Hygroscopic Micro/Nanolenses Along Carbon Nanotube Ion Channels <u>Yun-Tae Kim</u> and Chang Young Lee; Ulsan National Institute of Science and Technology, Korea (the Republic of)
NM04.03.07	The Influence of the CNC Contents to the Tensile Properties of Poly(Arylene Ether Sulfone)/Cellulose Nanocrystal Composite Fibers <u>Minjung Han</u> , Min-Jeong Kim, Hyejin Ju, Ga-Hyeun Lee, Changbeom Jeon and Han Gi Chae; Ulsan National Institute of Science and Technology, Korea (the Republic of)
NM04.03.11	TiO ₂ Nanorods Synthesized by Hydrothermal Method for Biophotovoltaic Cells Dariana Aguilar Rojas ¹ , Denise P. Murillo Sojo ¹ , <u>Daniela Zúñiga Rivera</u> ¹ , Mónica Carmona Córdoba ¹ , Jose Joaquin Sanabria Gómez ¹ , Venkatesan Renugopalakrishnan ² , Barry Bruce ³ and Claudia Villarreal ¹ ; ¹ Tecnológico de Costa Rica, Costa Rica; ² Northeastern University, United States; ³ University of Tennessee at Knoxville, United States
NM04.03.12	Electrical Properties of Pt-SnO ₂ /MWCNT Catalyst with Improved Catalyst Support Hyeongwoo Min ¹ , Ji Hyeok Choi ¹ , <u>Haeun Kang</u> ¹ , Dong-Joo Kim ² and Young Soo Yoon ¹ ; ¹ Gachon University, Korea (the Republic of); ² Auburn University, United States
SESSION NM04.04: Nanotube Applications I Session Chairs: Shigeo Maruyama, Ranjit Pati and Desiree Plata Tuesday Morning, May 10, 2022 Hawai'i Convention Center, Level 3, 301A	
8:30 AM *NM04.04.01	Functionalized Alkyne Precursors for Direct Placement of Heteroatoms in Carbon Nanotube Growth <u>Desiree Plata</u> ^{1,2} ; ¹ Massachusetts Institute of

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Technology, United States; ² Yale University, United States	
9:00 AM *NM04.04.02	Powerful, Large Stroke Electrochemical Carbon Nanotube Yarn Artificial Muscles <u>Ray H. Baughman</u> ; The University of Texas at Dallas, United States
9:30 AM NM04.04.03	Building Chiral Representations of Carbon Nanotube RBM Spectra for Sythesis Control and Analysis <u>Robert Waackler</u> ^{1,2} ; ¹ Air Force Research Laboratory, United States; ² UES, Inc., United States
9:45 AM NM04.04.04	Superstructures of 0D-Magic Semiconductor Clusters—Highly Luminescent and Catalytically Active by Assembly <u>Woonhyuk Back</u> and Taeghwan Hyeon; Seoul National University, Korea (the Republic of)
10:00 AM BREAK	
10:30 AM NM04.04.06	Nanocomposite Based on Silicon Nanowires-Nanometric Alumina-Conducting Polymer for Flexible Pseudocapacitors Marc Dietrich ^{1,2,3} , <u>Pascal Gentile</u> ^{1,2,4} , Anthony Valero ^{1,2,3} , Philippe Azais ^{1,3,4} and Said Sadki ^{1,3,4} ; ¹ CEA Grenoble, France; ² IRIG, France; ³ UGA/CNRS, France; ⁴ UGA, France; ⁵ LITEN, France
10:45 AM NM04.04.07	Facile Fabrication of Bimetallic Ag-Bi High Dense Nanospheres on Carbon Nanotubes for High Performance Supercapacitor Electrodes <u>Taewon Kim</u> and Wonjoon Choi; Korea University, Korea (the Republic of)
11:00 AM NM04.04.08	Highly Stretchable Thermoelectric Fabrics Woven from Carbon Nanotube-Coated Polymeric Fibers for Wearable Energy Harvesters <u>Doojoon Jang</u> ¹ , Kyung Tae Park ¹ , Sang-Soo Lee ¹ and Heesuk Kim ^{1,2} ; ¹ Korea Institute of Science and Technology, Korea (the Republic of); ² University of Science and Technology, Korea (the Republic of)
SESSION NM04.05: Nanotube Applications II Session Chairs: Ray Baughman, Don Futaba and Ming Xu Tuesday Afternoon, May 10, 2022 Hawai'i Convention Center, Level 3, 301A	
1:30 PM *NM04.05.01	Low-Voltage Operable, Flexible Analog/Digital Mixed-Signal Integrated Circuits Based on Carbon Nanotubes <u>Yutaka Ohno</u> ; Nagoya University, Japan
2:00 PM NM04.05.02	Fiber-type All Carbon Thermoelectric Devices Developed Using Wet-Spinning of Semiconducting Single-Walled Carbon Nanotubes <u>Yong Kim</u> , Woong-Ryeol Yu, HyunJoon Yang and YongMin Kim; Seoul National University, Korea (the Republic of)
2:15 PM NM04.05.03	Low Dimensional Carbon Materials for the Next Generation of Energy Storage, EMS, Sensors and Memory Applications <u>Paolo Bondavalli</u> ; Thales Research and Technology, France
2:30 PM NM04.05.04	Morphology and Dynamic Viscosity of Novel Phase-Change Systems with Plasma-Functionalized Graphene Nanoflakes for Emerging Methane Storage Technologies <u>Adam McElligott</u> , Jean-Luc Meunier and Phillip Servio; McGill University, Canada
3:15 PM NM04.05.08	Functional Chrysotile Nanotubes for Photodynamic Therapy <u>Valeria Secchi</u> ¹ , Irene Villa ² , Chiara Villa ³ , Anna Vedda ¹ , Yvan Torrente ³ and Angelo Monguzzi ¹ ; ¹ Università Bicocca, Italy; ² Institute of Physics, Czechia; ³ Università degli Studi di Milano, Italy
3:00 PM BREAK	
3:30 PM NM04.10.10	Photodegradation of Rhodamine Moieties by Controllable Porphyrin-Nanocarbon Agglomerates with Resonant Non-Linear Quenching Properties <u>Michael Spencer</u> ; University of Surrey, United Kingdom
SESSION NM04.06: Nanotube Applications III Session Chairs: Don Futaba, Ming Xu and Takeo Yamada Wednesday Morning, May 11, 2022 Hawai'i Convention Center, Level 3, 301A	
8:30 AM *NM04.06.01	Emerging Applications of Boron Nitride Nanotubes for Advanced Electronics and Biomedicine <u>Yoke Khin Yap</u> ; Michigan Technological University, United States

30개 이상의 구두/포스터 발표가 진행된 학회임을 증명하기 위해 본인 발표가 포함된 페이지 앞뒤로 여러 페이지를 같이 제출

4. 30개 이상의 구두/포스터 발표가 진행된 학회임을 증명(2) ▶ 모든 글씨가 선명하게 보이도록 캡처~!

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9:00 AM NM04.06.03	Water-Repelling Properties of Low-Dimensional Carbon Nanostructures <u>Makenna Parkinson</u> , Weston Miller and Albert Dato; Harvey Mudd College, United States
9:30 AM BREAK	
	SESSION NM04.07: Theory & Simulation I Session Chairs: Alister Page and Yoke Khin Yap Wednesday Morning, May 11, 2022 Hawai'i Convention Center, Level 3, 301A
10:30 AM NM04.07.02	<i>In Situ</i> SEM Synthesis and 3D Simulation of Carbon Nanotube Forests Ramakrishna Surya, Gordon Koerner, Filiz Bunyak, Prasad Callyam, Kannappan Palaniappan and <u>Matthew Maschmann</u> ; University of Missouri, United States
10:45 AM NM04.07.03	Effect of the Nanotube Chirality on Mechanical Properties of Thin Films Composed of Covalently Cross-Linked Carbon Nanotubes Kevin W. Kayang and <u>Alexey N. Volkov</u> ; University of Alabama, United States
11:00 AM NM04.10.06	Tailoring Morphology in Titania Nanotube Arrays by Implantation—Experiments and Modelling on Designed Pore Size - and beyond <u>Astrid Kupferer</u> ^{1,2} , Michael Mensing ^{1,3} , Jan Lehnert ¹ , Stephan Mändl ¹ and Stefan G. Mayr ^{1,2} ; ¹ Leibniz Institute of Surface Engineering, Germany; ² Universität Leipzig, Germany; ³ Fraunhofer Institute for Silicon Technology, Germany
	SESSION NM04.08: Theory & Simulation II Session Chairs: Alister Page and Ranjit Pati Wednesday Afternoon, May 11, 2022 Hawai'i Convention Center, Level 3, 301A
1:30 PM NM04.08.02	Rapid Thermochemical Pretreatment for Three-Fold Enhancement of Catalytic Lifetime and Four-Fold Tunability of Density in Chemical Vapor Deposition of Carbon Nanotubes Golnaz Najaf Tomaraei ¹ , Jaegun Lee ^{1,2} , Moataz Abdulhafez ¹ and <u>Mostafa Bedewy</u> ¹ ; ¹ University of Pittsburgh, United States; ² Pusan National University, Korea (the Republic of)
2:15 PM BREAK	
	SESSION NM04.09: Low Dimensional Nanostructures I Session Chairs: Don Futaba and Ming Xu Wednesday Afternoon, May 11, 2022 Hawai'i Convention Center, Level 3, 301A
3:30 PM *NM04.09.01	The Contrasting Strategies to Enhance Electrical and Thermal Conductivity in Nanocomposites—Direct Contact versus Quantum Tunneling <u>Seunghyun Baik</u> ; Sungkyunkwan University, Korea (the Republic of)
4:00 PM NM04.09.02	Chemical Modification of Double-Walled Carbon Nanotubes to Optimize Their Inclusion in Copper Matrix Composites <u>Mauricio Pavia</u> ¹ , Mélanie Emo ¹ , Fahad Alnjinman ¹ , Emmanuel Flahaut ² , Brigitte Vigolo ¹ and Ewa Kazimierska ³ ; ¹ Université de Lorraine, CNRS, Institut Jean Lamour, France; ² CIRIMAT, Université de Toulouse, CNRS, France; ³ Swansea University, Energy Safety Research Institute (ESRI), United Kingdom
4:15 PM NM04.09.03	Molecular Doping of Few-Walled Carbon Nanotubes with Ionic Liquid for High-Performance Flexible Thermoelectric Generators <u>Jae-min Jung</u> , Jong Gyu Oh, Sung Hoon Noh, Han Sol Yang and Jaeyoung Jang; Hanyang University, Korea (the Republic of)
4:30 PM NM04.09.04	Self-Catalytic Growth of 1D Materials Within Dislocations in Gold <u>Lotan Portal</u> , Iryna Polishchuk, Maria Koifman Khristosov, Alexander Katsman and Boaz Pokroy; Technion-Israel Institute of Technology, Israel
4:45 PM NM04.09.05	Multicolour Graphene Quantum Dots as a Non-Cytotoxic Platform for Cell Guidance <u>Inmaculada J. Gómez Pérez</u> , Anna Dolečková, Jirina Medalová and Lenka Zajíčková; Masaryk University, Czechia
	SESSION NM04.10: Poster Session II: Nanotubes and Related Low-Dimensional Nanostructures II Session Chairs: Don Futaba and Ranjit Pati Wednesday Afternoon, May 11, 2022

Final Program July 2022	
	5:00 PM - 7:00 PM Hawai'i Convention Center, Level 1, Kamehameha Exhibit Hall 2 & 3
NM04.10.03	High-Sensitivity and Ultra-Fast Recovery H2 Sensing Using Suspended Graphene-PEDOT:PSS:PEO Nanofiber Channels <u>Abiral Regmi</u> , Noori Na and Jiyoung Chang; The University of Utah, United States
NM04.10.05	Systematically Analysis of Magneto and Vertical Transport of SrRuO ₃ /SrTiO ₃ Superlattices <u>Hyunbom Kim</u> ^{1,2} , Seung Gyo Jeong ¹ , Sung Ju Hong ³ , Dongseok Suh ¹ and Woo Seok Choi ¹ ; ¹ Sungkyunkwan University, Korea (the Republic of); ² Center for Integrated Nanotechnologies, Korea (the Republic of); ³ Kangwon National University, Korea (the Republic of)
NM04.10.09	Physical Possibilities and Limits of DNA-Enabled Programmable 2D Self-Assembly <u>Nicholas Tjahjono</u> , Evgeni S. Penev and Boris I. Yakobson; Rice University, United States
	SESSION NM04.11: Low Dimensional Nanostructures II Session Chairs: Seunghyun Baik, Vivek Saraswat and Ming Xu Thursday Morning, May 12, 2022 Hawai'i Convention Center, Level 3, 301A
8:30 AM NM04.11.02	Oil-Free Compact X-Ray Generator Based on Carbon Nanotube Field Emitters <u>Shalini Rajpoot</u> ¹ , Jongmin Lim ¹ , Jinho Choi ¹ , Amar P. Gupta ¹ , Jeakyu Jang ² , Seung Bum Ryu ¹ , Kyung-Sik Yoon ¹ , Seung Jin Park ¹ and Jehwang Ryu ¹ ; ¹ Kyung Hee University, Korea (the Republic of); ² CAT Beam Tech. Co. Ltd., Korea (the Republic of); ³ DEXCOWIN Co. Ltd., Korea (the Republic of)
8:45 AM NM04.11.03	Charge Transport Dynamics in Microwave Synthesized One-Dimensional Molybdenum Chalcogenides <u>Jessica Ortiz Rodriguez</u> , Joseph Perryman and Jesus Velazquez; University of California, Davis, United States
9:00 AM NM04.11.04	Laser-Treated Transition Metal Oxides for Water Splitting <u>Jakub Wawrzyniak</u> ¹ , Jakub Karczewski ² , Emerson Coy ³ , Katarzyna Grochowska ¹ and Katarzyna Siuzdak ¹ ; ¹ Institute of Fluid-Flow Machinery, Poland; ² Gdansk University of Technology, Poland; ³ Adam Mickiewicz University, Poland
9:15 AM *NM04.11.05	Wafer-Scale Single-Crystal Film Growth of 2D Layered Materials and Heterostructures <u>Young Hee Lee</u> ^{1,2} ; ¹ Sungkyunkwan University, Korea (the Republic of); ² IBS Center for Integrated Nanostructure Physics, Korea (the Republic of)
9:45 AM BREAK	
10:15 AM NM04.11.06	Hot-Carrier Relaxation in CdSe/CdS Core/Shell Nanoplatelets Matthew Pelton ¹ , Yana Wang ² , Igor Fedin ³ , Dmitri V. Talapin ³ and <u>Stephen K. O'Leary</u> ² ; ¹ University of Maryland Baltimore County, United States; ² University of British Columbia, Canada; ³ The University of Chicago, United States
10:30 AM NM04.11.07	Asymmetric “Misfit” Nanotubes—Chemical Affinity Outwits the Entropy at High-Temperature Solid-State Reactions <u>Sreedhara M. B.</u> ¹ , Simon Hettler ² , Ifat Kaplan-Ashiri ¹ , Katya Rechav ¹ , Yishay Feldman ¹ , Andrey Enyashin ³ , Lothar Houben ¹ , Raul Arena ² and Reshef Tenne ¹ ; ¹ Weizmann Institute of Science, Israel; ² Universidad de Zaragoza, Spain; ³ Institute of Solid State Chemistry UB RAS, Russian Federation
10:45 AM NM04.11.09	1D Transition Metal Chalcogenides: Novel van der Waals Metals for Microelectronic Applications Jing Jin, Michelle Wurch, Thomas Empante and <u>Ludwig Bartels</u> ; University of California, Riverside, United States
11:00 AM NM04.10.07	Self-Assembled Hybrid Nanomaterials: Interactions of Lipid Bilayers with Metal Oxide Surfaces of Nanoscale Curvature <u>Tatvana I. Smirnova</u> , Maxim Voinov and Alex I. Smirnov; North Carolina State University, United States
	SESSION NM04.12: Low Dimensional Nanostructures III Session Chairs: Don Futaba, Young Hee Lee, Ranjit Pati and Vivek Saraswat Thursday Afternoon, May 12, 2022 Hawai'i Convention Center, Level 3, 301A
1:30 PM NM04.12.01	Comparative Study of Field Emission Performance of Directly Grown CNTs on Metal Alloy Using CVD and PECVD Processes for X-Ray Source <u>Amar P. Gupta</u> ¹ , Seung Jun Yeo ² , Jacik Jung ² , Jeung Sun Ahn ¹ and Jehwang Ryu ¹ ; ¹ Kyung Hee University, Korea (the Republic of); ² CAT Beam Tech Co., Ltd, Korea (the Republic of)
1:45 PM NM04.12.02	Effect of Electrostatic Boundary Condition and Orientation on Ferroelectric Nanotube <u>Mojue Zhang</u> ; University of Wisconsin-Madison, United