

Curriculum Vitæ

Hong-Sub Lee

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EDUCATION

8/2015 Yonsei University, Seoul, Korea.

Ph. D. in Materials Science and Engineering

Advisor: Prof. Hyung-Ho Park

Thesis: "A study on the resistive switching mechanism and the characteristics control of perovskite manganites : $(\text{Pr}, \text{La}, \text{Gd})_{0.7}(\text{Ca}, \text{Sr})_{0.3}\text{MnO}_3$ "

8/2007 Yonsei University, Seoul, Korea.

Bachelor in Ceramic Engineering

ACADEMIC APPOINTMENT

9/2022-Present Assistant Professor, Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University, Korea.

9/2018-8/2022 Assistant Professor, Department of Materials Science and Engineering, Kangwon National University, Korea.

RESEARCH EXPERIENCE

3/2016-8/2018 Postdoctoral Researcher, (PI: Prof. Mark C. Hersam)

Departments of Materials Science and Engineering, Northwestern University, Evanston, IL, USA.

9/2015-1/2016 Postdoctoral Researcher, (PI: Prof. Hyung-Ho Park)

Departments of Materials Science and Engineering, Yonsei University, Seoul, Korea.

RESEARCH INTERESTS

- ✓ **Memristors & Memtransistors:**
 - Ferroelectric tunnel junction; ferroelectric field-effect transistor
 - Redox-memristor; ionic memtransistor
- ✓ **Neuromorphic hardware**
- ✓ **Oxide electronic materials**
- ✓ **Strongly correlated electron system**
- ✓ **Synchrotron materials analysis**

SELECTED PUBLICATIONS

- 1 Sung-Eun Kim, Jin-Gyu Lee, Leo Ling, Stephanie E. Liu, Hyung-Kyu Lim, Vinod K. Sangwan*, Mark C. Hersam*, **Hong-Sub Lee***, "Sodium-Doped Titania Self-Rectifying Memristor for Crossbar Array Neuromorphic Architectures", *Advanced Materials*, 34 (6), 2106913 (2022)
- 2 Su-Min Kim, Sungkyu Kim, Leo Ling, Stephanie E. Liu, Sila Jin, Young Mee Jung, Hyung-Ho Park, Vinod K. Sangwan*, Mark C. Hersam*, **Hong-Sub Lee***, "Linear and Symmetric Li-Based Composite Memristors for Efficient Supervised Learning", *ACS Applied Materials & Interfaces*, 14 (4), 5673-5681 (2022)
- 3 **Hong-Sub Lee†**, Vinod K. Sangwan†, William A. Gaviria Rojas, Hadallia Bergeron, Hye Yun Jeong, Jiangtan Yuan, Katherine Su, Mark C. Hersam*, "Dual-Gated MoS₂ Memtransistor Crossbar Array", *Advanced Functional Materials*, 30 (45), 2003683 (2020) †Equal contribution
- 4 Vinod K. Sangwan†, **Hong-Sub Lee†**, Hadallia Bergeron, Itamar Balla, Kan-Sheng Chen, Megan E. Beck, Mark C. Hersam*, "Multi-Terminal Memtransistors from Polycrystalline MoS₂ Monolayer", *Nature* 554 (7693), 500-504 (2018) †Equal contribution
 - *News and Views* 'Neurons mimicked by electronics', *Nature* 554 (7693), 472-473 (2018)
 - *Research Highlight* 'Electronic devices: Making multi-terminal memtransistors', *Nature Reviews Materials*, 3, 18014 (2018)

PUBLICATIONS

- 1 Yu Min Lee, Byeong Min Lim, **Hong-Sub Lee***, "Selector-less crossbar array resistive RAM based on TiO₂ fabricated by photochemical metal-organic deposition", *Journal of Alloys and Compounds*, 977, 173312 (2024)
- 2 Jin-Woo Kim, Jun-Seok Beom, **Hong Sub Lee**, Nam-Seog Kim, "A Compact Model for Interface-Type Self-Rectifying Resistive Memory With Experiment Verification", *IEEE Access*, 12, 5081-5091 (2024)
- 3 Chaeseon Hong, Minjae Kim, Byeong-Min Lim, Sunil Moon, Keonwook Kang, Ioannis Kymissis, **Hong-Sub Lee***, Hyung-Ho Park*, "Improvement in the Stability of Cation (Si)/Anion (F or N) Codoped ZnO Thin-Film Transistors Formed via Atomic Layer Deposition", *International Journal of Energy Research*, 2023, 3608634 (2023)
- 4 Seung-Hyeon Kang, Seonguk Yang, Donghyun Lee, Sungkyu Kim*, Joonki Suh*, **Hong-Sub Lee***, "Investigating Series and Parallel Oxide Memtransistors for Tunable Weight Update Properties", *ACS Applied Electronic Materials*, 5 (6), 3232-3240 (2023)
- 5 Yujin Lee, Kangsik Kim, Zonghoon Lee, **Hong-Sub Lee**, Han-Bo-Ram Lee, Woo-Hee Kim*, Il-Kwon Oh*, Hyungjun Kim*, "Dysprosium Incorporation for Phase Stabilization of Atomic-Layer-Deposited HfO₂ Thin Films", *Chemistry of Materials*, 35 (6), 2312-2320 (2023)

- 6 Chaeseon Hong, Minjae Kim, Jin-Gyu Lee, Qingyi Shao, **Hong-Sub Lee**, Hyung-Ho Park*, "Research of Si-ZnO Thin-Film Transistors Deposited by Atomic Layer Deposition", *International Journal of Energy Research*, 2023, 7261186 (2023)
- 7 Minjae Kim, Malik Abdul Rehman, Donghyun Lee, Yue Wang, Dong-Hyeok Lim, Muhammad Farooq Khan, Haryeong Choi, Qing Yi Shao, Joonki Suh*, **Hong-Sub Lee***, Hyung-Ho Park*, "Fillamentary and Interface-Type Memristors Based on Tantalum Oxide for Energy-Efficient Neuromorphic Hardware", *ACS Applied Materials & Interfaces*, 14 (39), 44561-44571 (2022)
- 8 Yue Wang, Minjae Kim, Malik Abdul Rehman, Akendra Singh Chabungbam, Dong-eun Kim, **Hong Sub Lee**, Ioannis Kymissis, Hyung-Ho Park*, "Bipolar Resistive Switching in Lanthanum Titanium Oxide and an Increased On/Off Ratio Using an Oxygen-Deficient ZnO Interlayer", *ACS Applied Materials & Interfaces*, 14 (15), 17682-17690 (2022)
- 9 Minjae Kim, Yue Wang, Dong-eun Kim, Qingyi Shao, **Hong-Sub Lee***, Hyung-Ho Park*, "Resistive switching properties for fluorine doped titania fabricated using atomic layer deposition", *APL Materials*, 10(3), 031105 (2022)
- 10 Sung-Eun Kim, Jin-Gyu Lee, Leo Ling, Stephanie E. Liu, Hyung-Kyu Lim, Vinod K. Sangwan*, Mark C. Hersam*, **Hong-Sub Lee***, "Sodium-Doped Titania Self-Rectifying Memristor for Crossbar Array Neuromorphic Architectures", *Advanced Materials*, 34 (6), 2106913 (2022)
- 11 Yue Wang, Minjae Kim, Chan Lee, Akendra Singh Chabungbam, Jaeyeon Kim, Jeongwoo Lee, **Hong-Sub Lee**, Qingyi Shao, Hyunchul Sohn, Hyung-Ho Park*, "Electric field induced Mott transition and clockwise bipolar resistive switching in $\text{La}_2\text{Ti}_2\text{O}_{7-x}$ thin film", *Applied Materials Today*, 26, 101395 (2022)
- 12 Su-Min Kim, Sungkyu Kim, Leo Ling, Stephanie E. Liu, Sila Jin, Young Mee Jung, Hyung-Ho Park, Vinod K. Sangwan*, Mark C. Hersam*, **Hong-Sub Lee***, "Linear and Symmetric Li-Based Composite Memristors for Efficient Supervised Learning", *ACS Applied Materials & Interfaces*, 14 (4), 5673-5681 (2022)
- 13 Minjae Kim, Malik Abdul Rehman, Kyung-Mun Kang, Yue Wang, Sewon Park, **Hong-Sub Lee**, Sanjib Baran Roy, Seung-Hyun Chun, Chabungbam Akendra Singh, Seong Chan Jun, Hyung-Ho Park, "The role of oxygen defects engineering via passivation of the Al_2O_3 interfacial layer for the direct growth of a graphene-silicon Schottky junction solar cell", *Applied Materials Today*, 26, 101267 (2022)
- 14 Ki-Hoon Son, **Hong-Sub Lee***, "The Grain Boundary Effect on Resistive Switching Characteristic of Directly Patterned $\text{SrTi}_{1-x}\text{Fe}_x\text{O}_3$ by Photochemical Organic-Metal Deposition", *Applied Surface Science*, 575, 151754 (2022)
- 15 Jin-Gyu Lee, **Hong-Sub Lee***, "A Study on The Effect of Base-Reactant in Low-Temperature Atomic Layer Deposition of Zinc Oxide", *Physica Status Solidi (a)*, 218(24), 2100338 (2021)
- 16 Vinod K. Sangwan, Sonal V. Rangnekar, Joohoon Kang, Jianan Shen, **Hong-Sub Lee**, David Lam, Junhua Shen, Xiaolong Liu, Ana C. M. de Moraes, Lidia Kuo, Jie Gu,

- Haihua Wang, Mark C. Hersam*, “Visualizing Thermally Activated Memristive Switching in Percolating Networks of Solution-Processed 2D Semiconductors”, *Advanced Functional Materials*, 31(52), 2107385 (2021)
- 17 **Hong-Sub Lee**†, Vinod K. Sangwan†, William A. Gaviria Rojas, Hadallia Bergeron, Hye Yun Jeong, Jiangtan Yuan, Katherine Su, Mark C. Hersam*, “Dual-Gated MoS₂ Memtransistor Crossbar Array”, *Advanced Functional Materials*, 30 (45), 2003683 (2020) †Equal contribution
- 18 Jiangtan Yuan, Stephanie E Liu, Ahish Shylendra, William A Gaviria Rojas, Silu Guo, Hadallia Bergeron, Shaowei Li, **Hong-Sub Lee**, Shamma Nasrin, Vinod K Sangwan, Amit Ranjan Trivedi, Mark C Hersam*, “Reconfigurable MoS₂ Memtransistors for Continuous Learning in Spiking Neural Networks”, *Nano Letters*, 21 (15), 6432-6440 (2021)
- 19 Ki-Hoon Son, Kyung-Mun Kang, Hyung-Ho Park*, **Hong-Sub Lee***, “Effect of Hydrogen Doping on the Gate-Tunable Memristive Behavior of Zinc Oxide Films with and without F or N Doping” *Physica Status Solidi (a)*, 218 (16), 2000702 (2021).
- 20 Sung-Eun Kim, **Hong-Sub Lee***, “An electric field-assisted photochemical metal-organic deposition allowing control of oxygen content for resistive switching in directly patterned TiO_x films”, *Journal of the Korean Ceramic Society*, 58, 672-678 (2021)
- 21 Su-Min Kim, Hi Gyu Moon, **Hong-Sub Lee***, “Resistive Switching Characteristics of Directly Patterned Y-doped CeO₂ by Photochemical Organic-Metal Deposition”, *Ceramics International*, 46 (14), 22831-22836 (2020)
- 22 Ki-Hoon Son, **Hong-Sub Lee***, “Directly-Patternable Bi₂O₃ Nanoparticle for Polymer Nanocomposite Capacitor” *Coatings*, 10 (8), 752 (2020)
- 23 Sung-Eun Kim, Jin-Gyu Lee, In-Young Choi, Ha-Eun Kim, **Hong-Sub Lee***, “Resistive switching characteristic of Ce_{0.9}Y_{0.1}O₂/TiO₂ bi-layer structure by photochemical metal-organic deposition” *Journal of the Korean Ceramic Society*, 57(1) 73-79 (2020)
- 24 Yue Wang, Kyung-Mun Kang, Minjae Kim, **Hong-Sub Lee**, Rainer Waser, Dirk Wouters, Regina Dittmann, J. Joshua Yang, Hyung-Ho Park*, “Mott-transition-based RRAM”, *Materials Today*, 28, 63-80 (2019)
- 25 Vinod K. Sangwan†, **Hong-Sub Lee**†, Hadallia Bergeron, Itamar Balla, Kan-Sheng Chen, Megan E. Beck, Mark C. Hersam*, “Multi-Terminal Memtransistors from Polycrystalline MoS₂ Monolayer”, *Nature* 554 (7693), 500-504 (2018) †Equal contribution
 - *News and Views* ‘Neurons mimicked by electronics’, *Nature* 554 (7693), 472-473 (2018)
 - *Research Highlight* ‘Electronic devices: Making multi-terminal memtransistors’, *Nature Reviews Materials*, 3, 18014 (2018)
- 26 Joohoon Kang, Vinod K. Sangwan, **Hong-Sub Lee**, Xiaolong Liu, Mark C. Hersam*, “Solution-Processed Layered Gallium Telluride Thin-Film Photodetectors”, *ACS Photonics*, 5 (10), 3996-4002 (2018)

- 27 Wooje Han, **Hong-Sub Lee**, Byungwook Yoo, Hyung-Ho Park*, "Evaluation of Na_2TiO_3 formation for producing crystalline BaTiO_3 nanoparticles by liquid–solid–solution process at low temperature", *Journal of Alloys and Compounds*, 695, 2160-2164 (2017)
- 28 **Hong Sub Lee**, Hyung-Ho Park*, "Tunneling electroresistance effect with diode characteristic for cross point memory", *ACS Applied Materials & Interfaces* 8 (24), 15476-15481 (2016)
- 29 **Hong-Sub Lee**, Kyung-Mun Kang, Geun Young Yeom, Hyung-Ho Park*, "Evaluation of a ferroelectric tunnel memristor by ultraviolet–visible absorption using a removable liquid electrode", *Nanotechnology* 21, 215704 (2016)
- 30 **Hong-Sub Lee**, Sun Gyu Choi, Wooje Han, Hyung-Ho Park*, "Chemical and structural effects of lanthanide trivalent cation in $\text{Ln}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ (Ln=Pr and Sm) perovskite manganite on the resistive switching characteristic", *Current Nanoscience* 12 (6), 1-5 (2016)
- 31 Chang-Sun Park, **Hong-Sub Lee**, Dong Il Shim, Hyung Hee Cho, Hyung-Ho Park*, Kwang-Ho Kwon*, "The oxygen-deficiency-dependent Seebeck coefficient and electrical properties of mesoporous $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_{3-x}$ films", *Journal of Materials Chemistry A*, 4 (12), 4433-4439 (2016)
- 32 Wooje Han, **Hong-Sub Lee**, Uzma K. H. Bangi, Byungwook Yoo, Hyung-Ho Park*, "Dielectric properties of Poly(4-vinylphenol) with embedded PbO nanoparticles", *Polymers for Advanced Technologies*, 27, 245-249 (2016)
- 33 **Hong-Sub Lee**, Hyung-Ho Park*, M. J. Rozenberg*, "Manganite-based memristive heterojunction with tunable non-linear I-V characteristics", *Nanoscale* 7 (15), 6444-6450 (2015)
- 34 **Hong-Sub Lee**, Wooje Han, Hee-Yoon Chung, Marcelo Rozenberg, Kangsik Kim, Zonghoon Lee, Geun Young Yeom, Hyung-Ho Park*, "Ferroelectric tunnel junction for dense cross-point arrays", *ACS Applied Materials & Interfaces* 7 (40), 22348-22354 (2015)
- 35 **Hong-Sub Lee**, Hyung-Ho Park*, "The observation of valence band change on resistive switching of epitaxial $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ film using removable liquid electrode", *Applied Physics Letters* 107, 231603 (2015)
- 36 **Hong-Sub Lee**, Hyung-Ho Park*, "Manganite based hetero-junction structure of $\text{La}_{0.7}\text{Sr}_{0.7-x}\text{Ca}_x\text{MnO}_3$ and $\text{CaMnO}_{3-\delta}$ for cross-point arrays", *Nanotechnology* 26, 275704 (2015)
- 37 **Hong Sub Lee**, Geun Young Yeom, Hyung-Ho Park*, "Investigation into the influence of interfacial changes on the resistive switching of $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ ", *Journal of Physics D: Applied Physics* 48, 465309 (2015)
- 38 **Hong-Sub Lee**, Hyung-Ho Park*, "Band structure analysis of $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ perovskite manganite using a synchrotron", *Advances in Condensed Matter Physics* 2015, 746475 (2015)

- 39 Yong-June Choi, Kyung-Mun Kang, **Hong-Sub Lee**, Hyung-Ho Park*, "Non-laminated Growth of Chlorine-Doped Zinc Oxide Films by Atomic Layer Deposition at Low Temperatures", *Journal of Materials Chemistry C*, 3, 8336 (2015)
- 40 Yong-June Choi, Kyung-Mun Kang, **Hong-Sub Lee**, Hyung-Ho Park*, "Electromagnetic interference shielding behaviors of Zn-based conducting oxide films prepared by atomic layer deposition", *Thin Solid Films* 583, 226-232 (2015)
- 41 Hamidreza Hoshyarmanesh, Naser Nehzat, Mehdi Salehi, Mojtaba Ghodsi, **Hong-Sub Lee**, Hyung-Ho Park*, "Thickness and thermal processing contribution on piezoelectric characteristics of $\text{Pb}(\text{Zr-Ti})\text{O}_3$ thick films deposited on curved IN738 using sol-gel technique", *Proceedings of The Institution of Mechanical Engineers Part L-Journal of Materials-Design and Applications*, 229, 511-521 (2015)
- 42 **Hong-Sub Lee**, Chang-Sun Park, Hyung-Ho Park*, "Effect of La^{3+} substitution with Gd^{3+} on the resistive switching properties of $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ thin films", *Applied Physics Letters* 104, 191604 (2014)
- 43 **Hong-Sub Lee**, Sun Gyu Choi, Geun Young Yeom, Hyung-Ho Park*, "The effect of Gd substitution in perovskite lanthanum strontium manganite films for use in resistive switching devices" *Journal of the Ceramic Society of Japan* 122 (1428), 622-625 (2014)
- 44 Hamidreza Hoshyarmanesh, Naser Nehzat, Mehdi Salehi, Mojtaba Ghodsi, **Hong-Sub Lee**, Hyung-Ho Park*, "Piezoelectric Transducers on Curved Dispersive Bending Wave and Poke-Charged Touch Screens", *Materials and Manufacturing Processes* 29 (7), 870-876 (2014)
- 45 **Hong-Sub Lee**, Sun Gyu Choi, Hyung-Ho Park*, M. J. Rozenberg*, "A new route to the Mott-Hubbard metal-insulator transition: Strong correlations effects in $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ ", *Scientific Reports* 3, 1704 (2013)
- 46 **Hong-Sub Lee**, Sun Gyu Choi, Hye-Jung Choi, Sung-Woong Chung, Hyung-Ho Park*, "A study of resistive switching property in $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$, CaMnO_3 , and their bi-layer films", *Thin Solid Films* 529 (1), 347-351 (2013)
- 47 Yong-June Choi, Su Cheol Gong, Chang-Sun Park, **Hong-Sub Lee**, Ji Geun Jang, Ho Jung Chang, Geun-Young Yeom, Hyung-Ho Park*, "Improved Performance of Organic Light Emitting Diodes Fabricated on Al-Doped ZnO Anodes Incorporating a Homogeneous Al-Doped ZnO Buffer Layer Grown by Atomic Layer Deposition", *ACS applied materials & interfaces* 5 (9), 3650-3655 (2013)
- 48 Sun Gyu Choi, **Hong-Sub Lee**, Hyejung Choi, Sung-Woong Chung, Hyung-Ho Park*, "The effect of Ca substitution on the structural and electrical properties of $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ca}_x\text{MnO}_3$ perovskite manganite films", *Journal of Physics D: Applied Physics*, 46 (42), 425102 (2013)
- 49 Sun Gyu Choi, **Hong-Sub Lee**, Geun Young Yeom, Hyung-Ho Park*, "Investigation of the Properties of Ba-Substituted $\text{La}_{0.7}\text{Sr}_{0.3-x}\text{Ba}_x\text{MnO}_3$ Perovskite Manganite Films for Resistive Switching Applications", *Journal of electronic materials* 42 (6), 1196-1201 (2013)

- 50 Sun Gyu Choi, **Hong-Sub Lee**, Hyejung Choi, Sung-Woong Chung, Hyung-Ho Park*, "The effect of Sr concentration on resistive switching properties of $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ films", *Thin Solid Films* 529 (1), 352-355 (2013)
- 51 Sun Gyu Choi, **Hong-Sub Lee**, Hyejung Choi, Sung-Woong Chung, Hyung-Ho Park*, "Spectroscopic study on resistive switching property of perovskite manganite film with controlled oxygen-deficient state", *Journal of Physics D: Applied Physics* 44 (42), 422001 (2011)
- 52 Woo-Sic Kim, **Hong-Sub Lee**, Hye-Jung Choi, Sung-Woong Chung, Hyung-Ho Park*, "Comparative Studies of HfO_2 , Y_2O_3 , and CeO_2 Insulators in Metal- $\text{Nd}_2\text{Ti}_2\text{O}_7$ Ferroelectric-Insulator-Semiconductor Structures", *Ferroelectrics* 423 (1), 45-53 (2011)
- 53 Woo-Sic Kim, **Hong-Sub Lee**, Hyung-Ho Park*, Yun-Taek Hwang, "Properties of $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$, $\text{SrBi}_2\text{Ta}_2\text{O}_9$, and $\text{Nd}_2\text{Ti}_2\text{O}_7$ in a MFIS of Y_2O_3 insulator base structure for Fe FET", *Ferroelectrics* 413 (1), 1-10 (2011)
- 54 **Hong-Sub Lee**, Yun-Taek Hwang, Hyung-Ho Park*, "Structural and Electrical Properties of Direct-Patternable $\text{Bi}_{4-x}\text{Nd}_x\text{Ti}_3\text{O}_{12}$ Ferroelectric Thin Films", *Ferroelectrics* 400 (1), 255-262 (2010)
- 55 **Hong-Sub Lee**, Hye-Jung Choi, Sung-Woong Chung, Hyung-Ho Park*, "Effect of SrTiO_3 buffer layer on the phase formation and properties of direct-patternable BiFeO_3 thin films fabricated using photochemical metal-organic deposition", *Journal of the Ceramic Society of Japan* 118 (1383), 1024-1027 (2010)
- 56 **Hong-Sub Lee**, Hye-Jung Choi, Sung-Woong Chung, Hyung-Ho Park*, "Electric and ferroelectric properties of a multilayer film of $\text{Nd}_2\text{Ti}_2\text{O}_7$ and $\text{Bi}_{3.25}\text{La}_{0.75}\text{Ti}_3\text{O}_{12}$ for use as a ferroelectric field effect transistor", *Journal of the Ceramic Society of Japan* 118 (1383), 1017-1020 (2010)
- 57 Hyeong-Ho Park, **Hong-Sub Lee**, Hyung-Ho Park*, Xin Zhang, Ross H Hill, "Fabrication of sub 50-nm direct-patterned $\text{Pb}(\text{Zr,Ti})\text{O}_3$ films by electron beam-induced metal-organic deposition", *Journal of Electroceramics* 24 (3), 214-218 (2010)
- 58 Hyeong-Ho Park, **Hong-Sub Lee**, Hyung-Ho Park*, Ross H Hill, Yun Taek Hwang, "Electric and ferroelectric properties of PZT/BLT multilayer films prepared by photochemical metal-organic deposition", *Applied Surface Science* 255 (7), 4197-4200 (2009)
- 59 Hyeong-Ho Park, **Hong-Sub Lee**, Hyung-Ho Park*, Ross H Hill, Yun Taek Hwang, "Ferroelectric properties of direct-patternable La substituted $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ thin films formed by photochemical metal-organic deposition", *Journal of the Ceramic Society of Japan* 117 (5), 604-607 (2009)
- 60 Woo Sik Kim, Jun-Kyu Yang, Chang-Ki Lee, **Hong-Sub Lee**, Hyung-Ho Park*, "Synthesis and characterization of ferroelectric properties of $\text{Ce}_2\text{Ti}_2\text{O}_7$ thin films with Ce^{3+} by chemical solution deposition", *Thin Solid Films* 517 (2), 506-509 (2008)

PROCEEDING PUBLICATION

- 1 Vinod K. Sangwan[†], **Hong-Sub Lee**[†], Mark C. Hersam* “Gate tunable memristors from monolayer MoS₂”, *International Electron Devices Meeting* (IEDM), 5.1.1-5.1.4 (2017)
[†]Equal contribution

PATENT

- 1 Chan Sik Yoo, **Hong-Sub Lee**, “Method for reducing leakage current of oxide thin film and manufacturing method for oxide thin film using the same”, Republic of Korea, **10-2023-0136187**, 10.12.2023
- 2 Byeong Min, Lim, **Hong-Sub Lee**, “Alkaline ion based memristor device and method of manufacturing the same”, Republic of Korea, **10-2023-0127312**, 09.22.2023
- 3 Sung-Eun Kim, **Hong-Sub Lee**, “Metal oxide memristor doped with alkali metal and manufacturing method thereof”, Republic of Korea, **10-2548684**, 06.23.2023
- 4 Vinod K. Sangwan, **Hong-Sub Lee**, and Mark C. Hersam, “Dual-gated memtransistor crossbar array, fabricating methods and applications of same,” **US17/036,428**, 09.29.2020
- 5 Vinod K. Sangwan, **Hong-Sub Lee**, and Mark C. Hersam, “Multi-terminal memtransistors, fabricating methods and applications of same” **PCT/US2018/065929**, 12.17.2018
- 6 Hyung-Ho Park, **Hong-Sub Lee**, “Multilayer structure applicable to resistive switching memory having crossbar array structure, resistive switching memory having intermediate layer of the multilayer structure, and method for manufacturing the multilayer structure”, Republic of Korea, **KR 10-1583502**, 01.04.2016

FELLOWSHIP and HONOR

- 1 **Postdoctoral Fellowship (National Research Foundation of Korea)** (2017R1A6A3A03008332)
“A study on the memristive effect of two-dimensional nanoelectronic materials and gate tunable memristive components: multi-terminal memtransistor device”
(Period: 09/2017 ~ 08/2018)
- 2 **Young Scientist Award** (14th Korean Synchrotron Radiation Users' Association), Dec. 9, 2016
- 3 **Young Ceramist Best Presentation Award** (oral presentation)
(31th Korea-Japan International Seminar on Ceramics), Nov. 27, 2014