Dr. Lain-Jong (Lance) Li

Position

Professor, Chair of Future Electronics
Chair of Physics by Courtesy, University of Hong Kong
Associate Editor, Nano Letters (ACS)

Education

D.Phil of Condensed Matter Physics, Oxford University (UK) / 2006

Experience

-Process Engineer / TSMC (Taiwan) / Oct 1997 – Jul 1999
-Senior R & D Engineer, TSMC (Taiwan) / Jul 1999 – Jun 2002
-Assistant Professor, School of Materials Science and Engineering, Nanyang Technological University (Singapore) / Jun 2006 – Dec 2009
-Associate Professor, Academia Sinica (Taiwain) / Feb 2010 – Apr 2014
-Full Professor (Tenured), Institute of Atomic and Molecular Sciences, Academia Sinica (Taiwan) / May 2014 – Jul 2014
-Associate Professor, King Abdullah University of Science and Technology (Saudi Arabia) / Aug 2014 – Jul 2016
- Full Professor, King Abdullah University of Science and Technology (Saudi Arabia) / Aug 2016 – Dec 2017
-Director, Corporate Research in Taiwan Semiconductor Manufacturing Company (Taiwan)/Dec2017-present
-SHARP Professor, University of New South Wales (Australia) / Sep2018-Mar2021
-Mar2021 Professor: Chair Professor at University of Hong Kong

Dr. Lain-Jong (Lance) Li joined as a Chair Professor in nanomaterials for next-generation devices. He served as a Research Director in Corporate Research at Taiwan Semiconductor Manufacturing Company (TSMC) from 2017 to 2020.

Research interests: Two-dimensional materials (graphene, boron nitrides, transition metal dichalcogenides etc) hold promises in replacing silicon-based technology for manufacturing low-energy-consuming nanoelectronics. However, one of the major bottlenecks that prevent their seeming-less integration with current micro/nanoelectronics technologies is a lack of reproducible approach for wafer-scale synthesis of uniform, single crystalline membranes of these two-dimensional materials. His research is primarily focusing on solving these grand challenges from material and device perspectives for advancing future electronics and extending the Moore's Law.

Research Areas

Chemical vapor deposition and tool design

Growth of low-dimensional materials

Device fabrication and integration

Next-generation electronics

Selected Publications

· Ultralow contact resistance between semimetal and monolayer semiconductors., P.-C. Shen et al., **Nature** (2021 accepted)

· Wafer-scale single-crystal hexagonal boron nitride monolayers on Cu (111)., Chen, T. A. Chuu,C.P., Tseng, C.C., Wen, C.K., Wong, H.S.P., Pan, S., LI, R., Chao, T.A, Chueh, WC., Zhang, YF., Fu, Q., Yakobson, B. I., Chang, W.H. & Li, L.J* **Nature** (2020) 579, 219.

· Ledge-directed epitaxy of continuous, self-aligned and monolayer TMDs nanoribbons with single crystallinity., A. Aljarb et al., **Nature Materials** (2020) 19, 1300.

· Two dimensional semiconducting materials: Candidates for extending Moore's Law., M.Y. Li, S.K. Su, HS Wong* & LJ Li*, **Nature** (2019) 567, 169.

· Sub-nanometre channels embedded in two-dimensional materials., Han, Y., Li, M. Y., Jung, G. S., Marsalis, M. A., Qin, Z., Buehler, M. J., Li, L. J.* & Muller, D. A.* **Nature**

Materials (2018) 17, 129.

· Strain distributions and their influence on electronic structures of WSe2-MoS2 laterally strained heterojunctions. Zhang, C., et al. **Nature Nanotechnology** (2018) 13, 152.

· Janus monolayers of transition metal dichalcogenides. Lu, A. Y., Zhu, H., Xiao, J., Chuu, C. P., Han, Y., Chiu, M. H., Cheng, C. C., Yang, C.-W., Wei, K.-H., Yang, Y., Wang, Y., Sokara, D., Nordlund, D., Yang, P., Muller, D. A., Chou, M.-Y., Zhang, X.* & Li, L. J.* **Nature Nanotechnology** (2017) 12, 744.

· Epitaxial growth of a monolayer WSe2-MoS2 lateral p-n junction with an atomically sharp interface. Li, M. Y., Shi, Y., Cheng, C. C., Lu, L. S., Lin, Y. C., Tang, H. L., Tsai, M.-L., Chu, C.-W. Wei, K.-H., He, Jr-H., Chang, W.-H., Suenaga, K. & Li, L. J.* **Science** (2015) 349, 524.

· Large-Area Synthesis of Highly Crystalline WSe2 Mono layers and Device Applications., Huang, J. -K., Pu, J., Hsu, C. -L., Chiu, M. -H., Juang, Z. -Y., Chang, Y. -H. & Li, L. J.* **ACS Nano** (2014) 8, 923.

· Synthesis of large-area MoS2 atomic layers with chemical vapor deposition., Lee, Y. H., Zhang, X. Q., Zhang, W., Chang, M. T., Lin, C. T., Chang, K. D., Li, L.J* & Lin, T. W. **Advanced Materials** (2012) 24, 2320.

· Highly flexible MoS2 thin-film transistors with ion gel dielectrics. Pu, J., Yomogida, Y., Liu, K. K., Li, L. J.*, Iwasa, Y., & Takenobu, T. **Nano Letters** (2012) 12, 4013.

· Growth of large-area and highly crystalline MoS2 thin layers on insulating substrates. Liu, K. K., Zhang, W., Lee, Y. H., Lin, Y. C., Chang, M. T., Su, C. Y., Chang, C.S., Li, H., Shi, Y. M., Zhang, H., Lai, C. S. & Li, L. J*. **Nano Letters** (2012) 12, 1538.

Research Areas

Growth of low-dimensional materials

Nanomaterials and Devices

Post-Si electronics