

ENERGY, MANUFACTURING & MATERIALS FRONTIERS



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Publications

1. Gao, Y., Asadirad, M., Yao, Y., Dutta, P., Galstyan, E., Shervin, S., Lee, K.-H., Pouladi, S., Sun, S., Li, Y., Rathi, M., Ryou, J.-H., Selvamanickam, V. High-Performance Flexible Thin-Film Transistors Based on Single-Crystal-like Silicon Epitaxially Grown on Metal Tape by Roll-to-Roll Continuous Deposition Process. *ACS Appl. Mater. Interfaces* 2016, 8, 29565-29572.

2. Asadirad, M., Gao, Y., Dutta, P., Shervin, S., Sun, S., Ravipati, S., Kim, S.H., Yao, Y., Lee, K.H., Litvinchuk, A.P., Selvamanickam, V., Ryou, J.-H. High-Performance Flexible Thin-Film Transistors Based on Single-Crystal-Like Germanium on Glass. *Adv. Electron. Mater.* 2016, 2, 1600041.

3. Dutta, P., Rathi, M., Khatiwada, D., Sun, S., Yao, Y., Yu, B., Reed, S., Kacharia, M., Martinez, J., Litvinchuk, A.P., Pasala, Z., Pouladi, S., Eslami, B., Ryou, J.-H., Ghasemi, H., Ahrenkiel, P., Hubbard, S., Selvamanickam, V. Flexible GaAs Solar Cells on Roll-to-Roll Processed Epitaxial Ge Films on Metal Foils: A Route Towards Low-cost and High Performance III-V Photovoltaics. *Energy Environ. Sci.* 2019, 12, 756-767.

Patent Applications

1. US Patent Application No. 15/559,298; Improved Semiconductor Compositions.

2. US Patent Application No. 16/060,878; High Mobility Silicon on Flexible Substrates.

Dr. Selvamanickam is one of the world's leading experts of innovative manufacturing technologies with advanced materials especially using roll-to-roll processing. One of the areas of research that his group is focused on is the manufacturing of flexible electronics, such as high-performance, low-cost, large-area, flexible semiconductor devices. He has published several papers and filed several patent applications directed to his research. He was recently awarded the Career Innovator Award by Cullen College of Engineering for his track record in innovation, entrepreneurship, and mentorship at the University of Houston.

FLEXIBLE SEMICONDUCTOR DEVICE



Currently, semiconductors employed in flexible electronics devices have significant drawback in terms of performance. Additionally, flexible electronic devices are manufactured with organic and amorphous materials for low cost and suffer from inferior quality compared to crystalline semiconductors.

Dr. Selvamanickam's group has developed novel high-performance, flexible semiconductor devices for large-area applications by roll-to-roll processing. Specifically, his group has combined high-performance crystalline materials with flexible and inexpensive substrates to produce a low-cost, high-performance semiconductor device that can be used in high-power electronics and for large area sensors, displays and detectors.

The roll-to-roll semiconductor processing, device manufacturing, and metrology are conducted in the 13,000 sq.ft Semiconductor Device Fabrication Laboratory at UH Technology Bridge. This secure state of the art facility has unique manufacturing capabilities and equipment that enable research, development, testing, and production of innovative semiconductors and devices.

Flexible electronics comprising this semiconductor device have applications in various fields, including but not limited to medical, defense, security and energy.

