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## NANOMATERIALS AND NANOTECHNOLOGY

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### Waterloo Institute for Nanotechnology solving global challenges by bridging across the length scales

Waterloo Institute for Nanotechnology (WIN), with its 86 faculty members, is the global centre of excellence in nanoscience and nanotechnology. The unique feature about WIN is its ability to bridge the entire length scale from Å – mm and solve key challenges in terms of energy, water and public health. At the atomic scale, researchers are exploiting the quantum phenomena, followed by harnessing the advantages of two-dimensional materials like graphene and developing new nanomaterials with tunable functional properties. This enables researchers to build nanometer scale molecular machines. Such bottom-up approach in materials research and their fundamental understanding lead to development of new micro-sensors based on NEMS/MEMS technology. By integrating ICT platform, real-world devices are built, which range from integrated sensors to wearable gadgets. Currently, there is also a significant endeavor in utilizing machine learning and artificial intelligence coupled with Internetof-Things for nanotechnology. WIN has charted its new mission in bolstering its four thematic areas; smart and functional materials; connected devices; next generation energy systems; and theranostics and therapeutics. The discoveries by WIN scientists and engineers are fundamentally changing our world and helping solve some of humanities most pressing issues and at the same time driving industry 4.0 agenda.

#### **Biography**

Sushanta K Mitra is the Executive Director of Waterloo Institute for Nanotechnology and a Professor of Mechanical and Mechatronics Engineering and also crossappointed in the Department of Physics and Astronomy at the University of Waterloo. For his contributions in engineering and sciences, he has been elected as the Fellow of the American Society of Mechanical Engineers (ASME), the Canadian Society for Mechanical Engineering (CSME), the Engineering Institute of Canada (EIC), the Canadian Academy for Engineering (CAE), the Royal Society of Chemistry (RSC, UK), the American Physical Society (APS), the Indian National Academy of Engineering (INAE – Foreign Fellow) and the American Association for the Advancement of Science (AAAS).

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