**John Madden**



**Presentation** -  John Madden is a Professor of [Electrical & Computer Engineering](http://www.ece.ubc.ca/) at the [University of British Columbia](https://www.ubc.ca/) (UBC) in Vancouver Canada, where he has been since 2002. He is also the Director of the Advanced Materials & Process Engineering Laboratory ([AMPEL](http://www.ampel.ubc.ca/)) – a materials research centre housing 50 groups. His research interest is in the application of materials to create novel devices including [stretchable touch sensors](http://advances.sciencemag.org/content/3/3/e1602200), [artificial muscle](http://science.sciencemag.org/content/343/6173/868/), [solar batteries](http://ecst.ecsdl.org/content/72/12/23.short) and [photosynthesis-based light harvesters](https://onlinelibrary.wiley.com/doi/full/10.1002/adfm.201400350). John obtained a bachelor’s degree in Homours Physics from UBC in 1991, then left UBC to pursue a masters (McGill University, Biomedical Engineering, 1995) and PhD (Mechanical Engineering, MIT, 2000). Before returning to UBC John was a Research Scientist in the [Bioinstrumentation Laboratory](http://bioinstrumentation.mit.edu/research.html) at MIT.

**Research project** – Conducting polymers are plastics that are very good electronic conductors. They can also expand and contract as they are charged, making them interesting as artificial muscles. They offer low voltage operation, good change in length (1 – 20 %), and high force (10 times greater than muscle for the same area). The UBC team has been active in modeling and applying conducting polymer actuators, while at the [Laboratoire de Physicochimie des Polymères et des Interfaces](https://www.u-cergy.fr/fr/laboratoires/lppi.html), new materials are being developed that have greatly expanded the capabilities and possibilities, including ways of operating these normally wet materials in air, and making them [very fast](https://onlinelibrary.wiley.com/doi/full/10.1002/adfm.201400373). During this visit, we are exploring ways of making these devices expand and contract linearly, like muscle itself, rather than bending, as is normally the case for the artificial muscles – especially when they are operated in air. Linear actuation opens new possibilities for application to valves, switches, and biomedical devices, replacing heavier, more expensive motors – and maybe even seeing use in humans.

**Events** - *Workshop :***Innovation in tomorrow’s materials**, June 26th, 2018 at the Institute of Advanced Studies, Maison Internationale de Recherche (MIR), Neuville Campus. Organized with Pierre-Henri Aubert, Cédric Plesse and Frédéric Vidal of the [LPPI](https://www.u-cergy.fr/fr/laboratoires/lppi.html), with speakers from the Institute of Materials.