



Symposium K : Quantum Materials Research - Current Trends and Future Directions

Scope of the Symposium

Depending on the composition, Quantum Materials may act as conductors, insulators, semiconductors or even as superconductors. In quantum materials, new particles or pseudo particles are created that have completely new characteristics. Quantum materials offer a new regime with new rules and new capabilities that open up possibilities for completely nonconventional devices. We can rethink the basics of electronics and photonics and introduce functionality that was previously impossible. Combinations of different quantum materials are of high interest to explore new phenomena and act as the foundation for future electronic devices at the nanometer scale. The foundation of quantum materials follows from materials that are ideally suited to layered atomic-scale structures that control the flow of charge and spin such as shown in graphene and the class of materials known as Topological Insulators. The exploration and synthesis constitute only one aspect of the challenges in the development of new topological materials, another challenge is their characterization. Since the phenomena appear at very restricted and dedicated conditions, the characterization method must have very high sensitivity, resolution, localization and precision. The analysis of quantum materials presents new challenges on how to minimize surface and sample damage while imaging and analyzing structures at or beyond the direct atomic level, new approaches are considered in order to correlate materials properties with structure. The symposium will address challenging aspects of synthesis and characterization of quantum materials, as well as offer some insight into future research considerations. This symposium focuses on the synthesis, imaging, analysis and characterization of candidate quantum materials.

Abstracts will be solicited in (but not limited to) the following areas

- *Quantum materials synthesis and characterization techniques*
- *Hybrid quantum materials and devices*
- *Novel electron microscopy techniques for analysis of quantum materials*
- *New and developing analytical techniques, optical, x-ray, ions ... for quantum materials and quantum network development*
- *Aberration corrected microscopy of graphene and related 2D materials and devices*
- *Structural Characterization of Layered materials and Topological Insulators*
- *Characterization of Vacancy (NV etc.) centers in diamond or other optical materials*

Tentative list of invited speakers (To be confirmed)

Julia Mundy (*Harvard University*) **Rafal Dunin Borkowski** (*Director IMR, Peter Gruenberg Institute Research Centre Juelich*) **Frances Ross** (*MIT*) **Eva Olsson** (*Chalmers University, Sweden*) **Eiji Okunishi** (*JEOL Ltd.*) .

Symposium Organizers

David Bell (*Harvard University*) **Guillermo Solrzano-Naranjo** (*PUC-Rio*) .

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XIX Brazil MRS Meeting