Nanothermometry – Sensing with Nitrogen Vacancy Centers in Nanodiamond

Q Li[1]

[1] *Department of Physics, The Chinese University of Hong Kong, Science Center, New Territories, Hong Kong.*
Contact Phone: +85239436323
Contact Email: liquanhk@cuhk.edu.hk

Nitrogen-vacancy (NV) centers in diamond are promising quantum sensors for a variety of applications ranging from material science to bio-medicine. The dependence of the zero-field splitting of NV on temperature makes it a feasible temperature sensor. A few features of NV-based thermal sensing, including the high spatial resolution, high sensitivity, wide working temperature range, and compatibility with the various working environment, make it a most promising candidate for nanothermometry applications. In the present talk, we first show that spatially resolved temperature evolution can be monitored using NV-based thermal sensing in a working electrochemical device using nanodiamond (ND) sensors. We will then discuss a major limitation of the current thermal sensing using ND, that is, the temperature sensitivity, and further extends the discussion to strategies that can largely improve its sensitivity.

Acknowledgements: This work has been carried out in collaboration with Renbao Liu, Kangwei Xia, Wenghang Leong, Ning Wang, Gangqin Liu, Ting Zhang, Manhin Kwok, Chufeng Liu, and Ruqiang Dou. We acknowledge funding from ANR/RGC (project No. A-CUHK404/18)