Investigating mechanical property of soft materials by diamond quantum sensing

Quan Li

Department of Physics, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong, China; Centre for Quantum Coherence, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong, China

Nitrogen-vacancy (NV) in diamond serves as a promising sensor for many applications ranging from condensed matter physics to biomedicine. In the present work, we developed a new scheme to investigate the mechanical properties of soft materials using diamond nanoparticles as the quantum sensors. We showed proof-of-the-concept demonstration using polydimethylsiloxane (PDMS) film and gelatin microparticle. The excellent sensitivity and spatial resolution associated with such a technique enable the disclosure of heterostructured nature of the former, and effect of surface tension in the latter. This work has been carried out in collaboration with Renbao Liu, Kangwei Xia, Wenghang Leong, Manhin Kwok, Chufeng Liu, and Zhiyuan Yang. We acknowledge funding from CRF of RGC (Project No. C4006-17G); and CUHK Group Research Scheme (Project No. 31110126).