ダイヤモンド NV 中心を使った量子センシングの分子・細胞生物学への応用

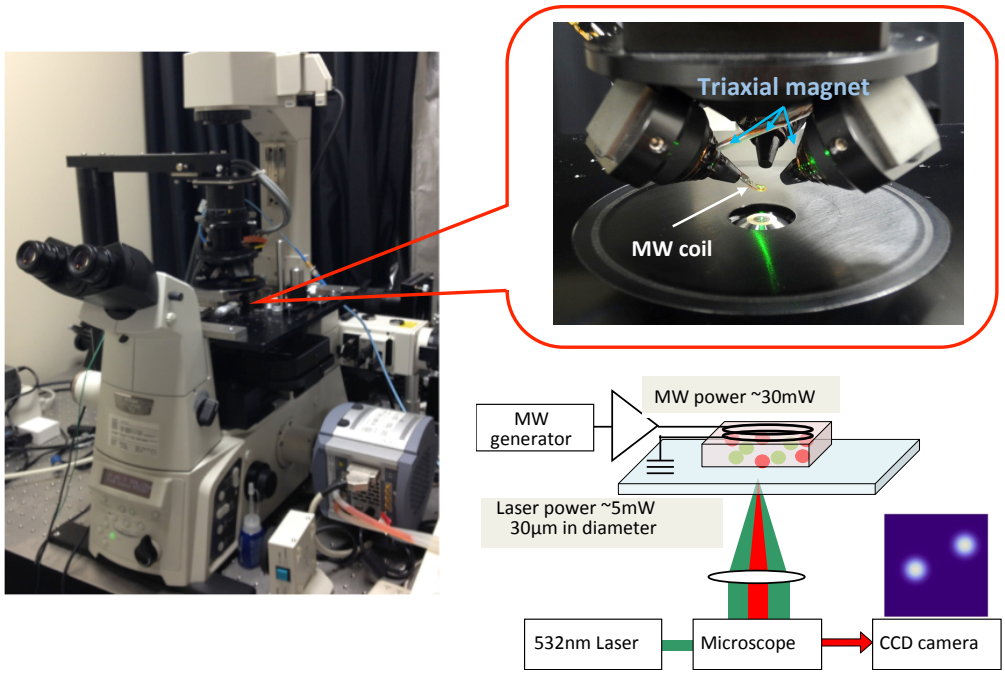
Cell biology using nanogyroscope by optically detected magnetic resonance (ODMR) spectroscopy

京大院工 [1], 科学技術振興機構 [2] ○白川 昌宏 [1], 五十嵐 龍治 [2]

Kyoto Univ. [1], JST [2], ○Masahiro Shirakawa[1], Ryuji Igarashi[2]

E-mail: shirakawa@moleng.kyoto-u.ac.jp

The conformational changes and dynamic properties of macromolecules/molecular assemblies, such as plasma membranes, cytoskeletons and organelle are coupled with and important for various cellular functions, such as cellular responses to external signals. However, the conformational changes of molecules and molecular assemblies often take place as rotational movements of lobs, domains or subunits of molecules relative to the other parts. These structural changes alter rather little lateral distances between sites of molecules and their assemblies, but are associated with rather large orientation changes. Thus, to analyze dynamic properties of cellular components, tracking their orientations is often useful.

We have constructed microscopes which enable us to observe optically detected magnetic resonance (ODMR) spectroscopy. Then, by combining the ODMR microscope with an assembles of pulsed-magnetic field generator, we could determine the orientations of diamond particles. I will introduce several cell-biological applications in which electros inside nanodiamonds are used as quantum probes.

ODMR microscope