
Microwave-to-optical photon conversion via NV-center spin ensembles

Yuimaru Kubo*†1

¹Okinawa Institute of Science and Technology (OIST) – 1919-1 Tancha, Onna, Okinawa 904-0495, Japan

Abstract

We report a spin-ensemble-based microwave-to-optical transducer employing nitrogen-vacancy (NV) centers in diamond. The system combines a rutile dielectric microwave resonator ($Q_{\text{int}} > 10^4$) with a diamond-integrated Fabry-Pérot optical cavity operated at 10–20 mK. Under coherent optical pumping of the NV ensemble, we observe heterodyne signals corresponding to up-converted microwave excitations at ~ 5.6 GHz. The present conversion efficiency ($\sim 10^{-12}$) is mainly limited by spatial and spectral mode mismatches between the microwave and optical cavities.

Keywords: NV centers, quantum transduction

*Speaker

†Corresponding author: yuimaru.kubo@oist.jp