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Spin-wave waveguides and optical magnonics in one-dimensional NiO nanorods[1] YUAN-RON MA, National Dong Hwa University — Recently, the antiferromagnetic magnon property of NiO has also attracted much attention for use in magnonics, such as terahertz (THz) radiation, and magnetization control. However, apart from the studies mentioned above, there have been no successful uses of NiO in magnonics, because it is difficult to perceive the spin waves and magnonic functions in various nanostructures. Here we show the two-magnon (2M) THz spin-wave waveguides and optical magnonics in the one-dimensional (1D) NiO nanorods because the 1D morphology is more applicable to nanoelectronics and nanodevices as well as waveguides. Their average length of ˜700 nm makes the 1D NiO nanorods the smallest spin-wave waveguides. In addition, the polarized laser beam passing through the 1D NiO nanorods at various incident angles and at an applied alternating-current (AC) magnetic field perpendicular to the growth direction of the 1D NiO nanorods can generate and interact with the spin waves in the 1D NiO nanorods. Due to the magneto-optical Faraday effect (MOFE), the change in the Faraday intensity can show the 2M information in the 1D NiO nanorods. There are only two MOFE results at various incident angles and AC magnetic fields, which represent the 2M-on and 2M-off states, and it is these states that give 1D NiO nanorods very good potential for use in optical nano-magnonics.

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