High-efficient excitation of phonon polaritons in hexagonal boron nitride by silver nanowires

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Summary
We spin-coated silver nanowires onto hexagonal boron nitride (hBN) flakes and carried out scanning near-field optical microscopy (SNOM) on the samples. We observed high-efficient excitation of phonon polaritons in hBN by silver nanowires. At the same time, we observed phonon polaritons excited by AFM tip reflected back upon reaching silver nanowires.

Phonon polaritons excited by Ag nanowire

Basic characterizations

Figure 1 | Phonon polaritons launched by silver nanowires on hBN, (a) An AFM topographical image of a silver nanowire on hBN. (b) Near-field infrared nanoscopy image of Ag nanowire/hBN at excitation wavelength of 6.65 μm, which shows fringes from Ag nanowire-launched and tip-launched phonon polaritons.

Figure 2 presents phonon polaritons excited by Ag nanowires at different excitation wavelengths. Out of hyperbolic frequency range of hBN, we just observed the plasmon polaritons on Ag nanowires, as shown in Figure 2a. In the phonon resonance range of hBN, the dispersion relation of phonon polaritons of hBN is hyperbolic, as showed in Figure 3.

Figure 3 | The dispersion relation of phonon polaritons in hBN.

References