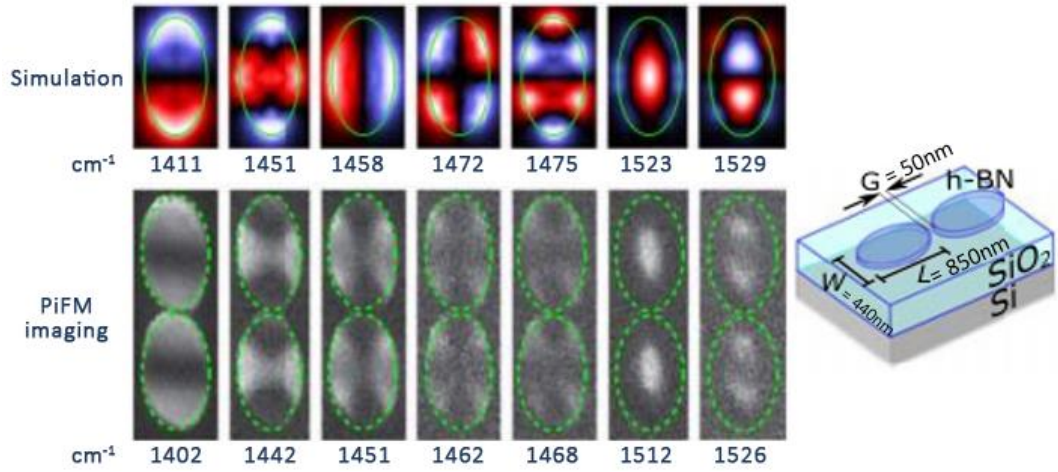
Photo Physics
Hexagonal Boron Nitride Optical Nano-dipole Antennae

Hexagonal boron nitride has been proposed as an excellent candidate to achieve subwavelength infrared light manipulation, enabling excitation of low-loss phonon polaritons with hyperbolic dispersion. The publication of Tamagone et al. from the Harvard University show that subwavelength hexagonal boron nitride nanostructures can exhibit ultra-confined resonances and local field enhancement. They have investigated strong light-matter interaction in these nanoscale structures via photo-induced force microscopy (PiFM). PiFM captures ultra-confined resonances and local field enhancement in hexagonal boron nitride optical nano-dipole antennae.

PiFM works by mechanically detecting the gradient of the optical force generated by near fields on the AFM tip without the need for optical detection. Operation in non-contact or light tapping Sideband-BimodalTM AFM mode prevents even the softest samples from damage and achieves higher spatial resolution than AFM topography due to the steeper functional dependence of dipole-dipole force gradient on the tip-sample distance.

The advantage of using PiFM is the acquisition of *hyperspectral* images of all the resonant modes in a structure with a single scan. Hyperspectral PiFM demonstrates excellent agreement between the theoretical simulations and the mapped resonance modes.

The First 7 Resonant Modes in a Single Elliptical Hexagonal Boron Nitride Optical Nano-dipole Antenna Arm



Tamagnone et al., Sci. Adv. 2018; 4: eaat7189 15 June 2018 DOI: 10.1126/sciadv.aat7189

Video for Hyperspectral PiFM for different wavelengths in the RS2 band.

aat7189_MovieS2.mp4

ST Instruments BV
Energieweg 20b
2964LE Groot-Ammers
The Netherlands
www.linkedin.com/company/st-instruments

T: +31-(0)184-640000
F: +31-(0)184-640001
info@stinstruments.com