Abstract Submitted
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Temperature-dependent excitonic superfluid plasma frequency evolution in excitonic insulator, Ta_2NiSe_5[1] JUNGSEEK HWANG, YU-SEONG SEO, Sungkyunkwan University, MAN JIN EOM, JUN SUNG KIM, CHANG-JONG KANG, BYUNG IL MIN, Pohang Science and Technology University — We investigate an excitonic insulate, Ta_2NiSe_5, using optical spectroscopy. Ta_2NiSe_5 has quasi-one dimensional chains along the a-axis. We have obtained anisotropic optical properties of a single crystal Ta_2NiSe_5 along the a- and c-axes. The measured a- and c-axis optical conductivities exhibit large anisotropic electronic and phononic properties. With regard to the a-axis optical conductivity, a sharp peak near 3050 cm^{-1} at 9 K, with a well-defined optical gap ($\Delta^{EI} \simeq 1800$ cm^{-1}) and a strong temperature-dependence, is observed. With an increase in temperature, this peak broadens and the optical energy gap closes around $\sim$325 K(T_c^{EI}). The spectral weight redistribution with respect to the frequency and temperature indicates that the normalized optical energy gap ($\Delta^{EI}(T)/\Delta^{EI}(0)$) is $1-(T/T_c^{EI})^2$. The temperature-dependent superfluid plasma frequency of the excitonic condensation in Ta_2NiSe_5 has been determined from measured optical data.

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Jungseek Hwang
Sungkyunkwan University

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