Electronic Supplementary Material (ESI) for Nanoscale.

Dirac Surface Plasmons in Photoexcited Bismuth Telluride Nanowires : Optical Pump-Terahertz Probe Spectroscopy

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I. ATOMIC FORCE MICROSCOPIC (AFM) IMAGE

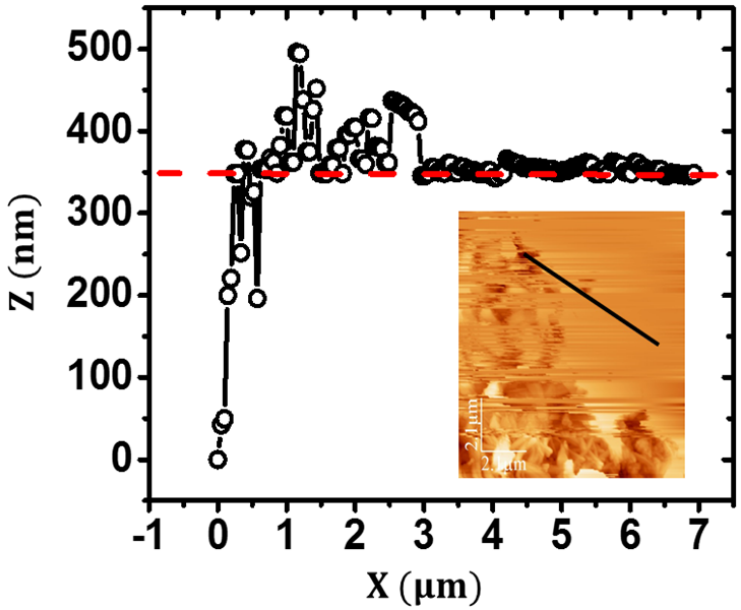

FIG. S1. AFM image of the sample on quartz substrate showing the film thickness (t) of $\sim$ 350 nm

II. DIFFERENTIAL PHOTOCONDUCTIVITY SPECTRUM ($\Delta\sigma(\omega)$)

Fig.S2 shows the differntial photoconductivity spectrum ($\Delta\sigma(\omega)$) at $\tau_{pp} = 4$ps with the pump fluence of 82.8μJ/cm^2. The solid lines corresponds to the fit obtained using the modified Drude Smith conductivity given as,

$$\Delta\sigma(\omega) = \frac{D^*\tau'^*}{1 - i\omega\tau'^*}\left(1 + \frac{1}{1 - i\omega\tau^*_{diff}}\right) - \sigma_o(\omega) \tag{S1}$$

where, $\sigma_o(\omega)$ is the steady state THz conductivity spectrum, given by;

$$\sigma_o(\omega) = \frac{D_o\tau'}{1 - i\omega\tau'}\left(1 - \frac{1}{1 - i\omega\tau_{diff}}\right) + \frac{-iL_o\omega}{\omega^2_{ph} - \omega^2 - i\omega\gamma_o} \tag{S2}$$

However, in fitting $\Delta\sigma(\omega)$ using Eq. (S1), we have considered Ł$_o = 0$ to explicitly show the contribution of modified-Drude Smith (MDS) conductivity to $\Delta\sigma(\omega)$. The significant

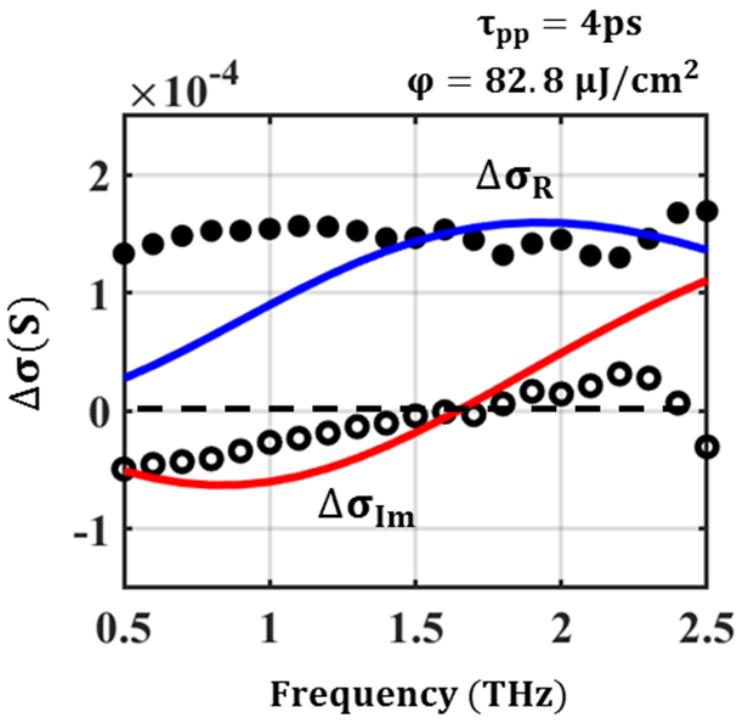

FIG. S2. The pump induced differential conductivity spectrum ($\Delta\sigma(\omega)$) fitted using the modified Drude-Smith model using Eq.(S1)

deviation of the fitted curve from the experimental results confirms that $\Delta\sigma(\omega)$ cannot be explained using the MDS model.