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**Local heating of ZnO due to the surface plasmon excitation of Au nanoparticles**[1] OSHADHA RANASINGHA, NETL, Pittsburgh / WVU, Morgantown, CONGJUN WANG, NETL, Pittsburgh / URS, Pittsburgh, JAMES P. LEWIS, NETL, Pittsburgh / WVU, Morgantown, CHRISTOPHER MATRANGA, NETL, Pittsburgh — Temperature dependent $E_2$*(high)* Raman active optical phonon mode was investigated to identify the local heating of the ZnO, due to the surface plasmon excitation of the Au nanoparticles. The variation of the linewidth (FWHM) of $E_2$*(high)* mode for ZnO was investigated from room temperature to 450 °C with 25 °C steps under constant 532 nm laser excitation intensity of $2.6*10^5$ W/m$^2$. Linewidth (FWHM) was increased with the temperature and it was fitted into the theoretical model originally developed by Menendez *et al*, which contains both cubic and quadratic anharmonicities. After optimizing the cubic and quadratic anharmonic coupling constants, the fit was used to estimate the local temperatures of Au/ZnO, which were irradiated with different laser intensities. The estimated local temperature for Au/ZnO was 613 °C at the laser intensity of $8.1*10^5$ W/m$^2$. ZnO without Au nanoparticles didn't show any large temperature variation under the different laser intensities. This is a clear evidence for the heat generation of Au nanoparticles due to the surface plasmon excitation.

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