

**Pong, Tsai, and Chang Reply:** The physics presented in our paper [1] concerned the trend of the shifts of the exciton binding energy and the conduction band minimum (CBM) with respect to the size of the diamond nanocrystallites. The question raised in the Comment [2] by Ley, Ristein, and Graupner concerned the determination of CBM of the bulk diamond and diamond microcrystallites. Ley, Ristein, and Graupner argued that the fitting of the x-ray absorption near edge structure (XANES) spectrum to the arctangent function was not proper because it did not take into account core-hole-conduction-band couplings of Shirley [3] and Elliot's theory [4] which considered the conduction-band density of states. However, we remind the readers that for the purpose of the determination of CBM, i.e., the threshold of the XANES continuum spectrum, the detailed shape of the spectrum contributed by the core-hole-conduction-band interactions and the conduction-band density of states is not crucial. Without broadening, the threshold is a well-defined starting point of the continuum spectrum irrespective of the detailed shape of the spectrum. In the real XANES continuum spectrum, the threshold is not clear because the spectrum tails into the lower energy side due to instrumental and thermal broadening. The tailing due to instrumental and thermal broadening of the spectrum is commonly fitted with the arctangent function in order to determine the threshold [5]. The use of the arctangent function to represent the threshold region of the XANES spectrum is similar to the use of the Gaussian or Lorentzian function to represent a resonance line spectrum. The use of these functions is based on the resemblance of these mathematical functions to most observed spectra. Without the knowledge of the details of the instrumental response, thermal effect, transition probability, and the electronic structure, these functions are the best one can use. We disagree with Ley, Ristein, and Graupner on the meaning of the arctangent fitting of the spectrum.

In our paper, the fitting of the arctangent function is primarily determined by the tailing of the spectrum into the

lower energy side (Fig. 3). The suggestion made by Ley, Ristein, and Graupner that we obtained the 0.19 eV exciton binding energy for the 5  $\mu\text{m}$  grain diamond by fitting to Morar *et al.*'s value for the (bulk) single crystal diamond [6] is not true. The tailing of the spectrum due to instrumental and thermal broadening is not crucially affected by the detailed shape of the spectrum contributed by the core-hole-conduction-band interactions and conduction-band density of states. The fits presented in Figs. 3(a) and 3(b) of our paper [1] closely resemble those of carbon-related materials reported previously [7]. The Elliot's theory assumed a simplified conduction-band density of states, which may differ significantly from those of the actual densities of states of diamond nanocrystallites. Its use is not necessarily an improvement of the fitting.

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