

Exciton energy Kataura plot and excitonic effect of single wall carbon nanotubes

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We calculate exciton energy of single wall carbon nanotubes (SWNTs). The exciton energy depends on the surrounding materials of the SWNT [1]. This environmental effect is expressed by the dielectric constant [2]. In previous paper we used the static dielectric constant in order to reproduce the resonance Raman experiment for bundle samples [3,4]. However, since the dielectric constant depends on the nanotube diameter [5] and the surrounding materials, we need to consider a correction to the environmental effect for other samples. In this paper we discuss the environmental effect of SWNTs. The exciton energy of SWNTs is calculated by solving the Bethe-Salpeter equation in which the one particle energies are given by the extended tight-binding scheme [3]. We also compare our calculation with the resonance Raman experiments in the different environment. From our calculation we show the exciton energy Kataura plot for different samples.

References

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