PURIFICATION OF SINGLE WALL CARBON NANOTUBES PREPARED BY LASER VAPORIZATION FOR ELECTRONIC APPLICATIONS. \underline{Phillip F. Britt},

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A variety of methods have been developed for the synthesis of single wall carbon nanotubes (SWNT) which have focused on determining the conditions to maximize production rate and purity. Although it would be desirable to produce pure SWNT, the current reality is that additional chemical purification treatments are required to remove residual metal catalyst and amorphous plus graphitic carbon from the SWNT. We are currently interested in the production of SWNT for electronic applications. Since the electronic transport through SWNT depends upon defects induced by post-synthesis purification methods, the synthesis conditions should be optimized so that the impurities can be removed under the gentlest conditions to avoid damaging the tubes. In this investigation, the effect of the laser pulse width on the production of SWNT and the associated impurities was investigated. There is evidence to suggest that the carbonaceous impurities formed from long laser pulses are easier to remove than those impurities formed by short pulses.[1] A comparison of SWNT samples resulting from laser vaporization at 1150 oC with short-pulses (8 ns, 1.06 μm), and long-pulses (a train of ~80, 200ns-pulses, total length 200 μs, 1.06 μm) were investigated by Raman spectroscopy, TEM, FESEM, and thermogravimetric analysis. The SWNT were then purified by a combination of chemical and/or thermal oxidative treatments and characterized again by the techniques described above. The results from this study will be presented, and the optimum conditions for production of SWNT for electronic applications will be discussed. This research was sponsored by the U.S. Department of Energy and the Laboratory-Directed Research and Development Program at ORNL under contract DE-AC05-00OR22725 with the Oak Ridge National Laboratory, managed by UT-Battelle, LLC. [1] (a) Dillon, A.C.; Gennett, T.; Jones, K. M.; Alleman, J.L.; Parolla, P. A.; Heben, M. J. {\it Adv Mater} {\bf 1999}, {\it 11}, 1354-1358. (b) Dillon, A.C.; Parolla, P. A.; Alleman, J.L.; Perkins, J. D. Heben, M. J. {\it Chem. Phys Lett.} {\bf 2000}, {\it 316}, 13-18.

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