

## **A New Route to Synthesis of Graphene and Graphenol Nanoparticles**

**Gary W. Beall**, Y. Vecherkina, B. Henderson, A. Koshknbayeva

Texas State University, Department of Chemistry and Biochemistry, 601 University Drive, San Marcos,  
TX, USA

Gb11@txstate.edu

Since the reporting of the discovery of graphene in 2004 a great deal of excitement has been generated in the research community. This interest is due to the fact that graphene exhibits very unique properties including very high electrical and thermal conductivities and the highest tensile strength ever measured. The majority of graphene is currently made by exfoliating graphite with strong acids and oxidizing conditions to first form graphene oxide followed by reduction to graphene. Graphene has also been made by utilizing chemical vapor deposition. These methods result in graphene that is rather expensive. This has been one of the road blocks encountered in commercialization of carbon nanotubes. For both graphene and carbon nanotubes the cost has limited the penetration of them into mass commercial applications. The work reported in this talk should overcome this hurdle to commercialization. A process will be reported that produces graphene and edge functionalized graphene at very low cost. The process starts with carbonaceous material that is very inexpensive and two chemical steps that do not require strong oxidizing acids or strong reductants. The process will be presented in detail. Examples of polymer nanocomposites produced utilizing the graphene or functionalized graphene will also be presented. Commercial quantities utilizing the process are being produced and will also be discussed.