

**Department of Electrical and Computer Engineering
Materials Engineering Program**

**Texas Center for Superconductivity at Univ. of Houston
Center for Integrated Bio and Nano Systems**

10:00 a.m., Jan. 21, 2022

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Carbon Circularity: from Carbon Byproducts to Effective Reinforcements and Graphene

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Abstract: In this work are presented the results of carbon reutilization from byproduct sources such as: black carbon, soots, biomass, PetCoke, etc. The byproducts had been processed by green methods to synthesized carbon nanostructures with outstanding mechanical properties ideal for composites. The synthesis methods are mainly milling and induction sintering with unique results demonstrating the successful synthesis of pristine blends of graphene, graphitic carbon, morphed graphene, among other nanostructures. All the process is conducted using physical and green methods such as milling and induction sintering. All milling conditions are carried at room temperature. The carbon nanostructures had been used to reinforce several types of composites such as ceramic, metals, polymers, biopolimers, etc. The resulting composites show outstanding mechanical behavior, including unprecedented elastic behavior under nano, micro and meso scale testing. Numerical simulations are used to further demonstrate and explain the atomic behavior of and its effect on composites. Our results demonstrate that rapid sintering can transform the as milled carbon into more complex nanostructures that act as effective reinforcements. To conclude we demonstrate some applications including biorecyclable and bio-compostable composites among others.



Short Bio:

Dr Robles has a Bachelor, a Master and a PhD of Science degrees in Materials Science and Engineering. Dr. Robles has more than 20 years of research and industrial experience in Materials Science, Engineering and Manufacturing. He authors more than 110 peer review papers, 140 conferences presentations, 5 patents, 4 conference proceedings, and major reports for US Government, etc. During his career Dr. Robles had the opportunity to work for the Transportation Technology Center, Inc. (TTCI) as a Manager and a Principal Investigator of research projects with budgets of approximately 1 MUSD/year. In August 2008 he started his tenured track career at the University of Houston at the College of Technology as an Assistant Professor, in 2014 he became Associated Professor with Tenure, he was the

graduate program coordinator from 2009 to 2014 and he became professor in 2020. He is an adjunct faculty at Rice University since 2018.