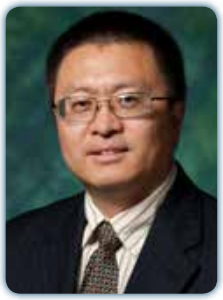
Sheldon Q Shi, J Aeronaut Aerospace Eng 2017, 6:3 (Suppl)
DOI: 10.4172/2168-9792-C1-018



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Natural fiber for automobile and aerospace components design

This presentation talks about the new technologies of using the natural fibers to replace the synthetic fibers (fiber glass, carbon fibers) for automobile and aerospace structural and nonstructural components design. The manufacturing processes for the natural fiber composites are discussed including laminated sheet molding compounding (SMC) process, and vacuum assist resin transfer molding process, and other processes. The physical, mechanical and durability performance of the natural fiber SMC are presented in a comparison with the commercial synthetic SMC products. The pros and cons of using the natural fiber to replace the synthetic fibers are discussed. A novel in situ nanoparticle impregnation process for the lignocellulosic fibers is also presented. This process is to introduce the ionic liquids into the micropore structure of the cellulosic fibers consecutively. When a precursor applies at certain conditions (such as increasing the temperature), the impregnated chemicals react inside the micropore structures of the fibers and to form the desired nanoparticles. This technique takes advantage of the porous structure of the cellulosic fibers permitting the nanoparticles to be more evenly distributed into the resulted natural fiber products. By the impregnation treatment of the cellulosic fiber with different nanophases (such as noble metals, iron, iron oxides, and etc.), the resulted products will present certain functions, such as magnetic, anti-static, anti-radiation, anti-permeation, anti-microbial, and etc. Some functional properties of the resulted functional composites will be discussed, such as EMI shielding panel, magnetic activated carbon, and etc.

Biography

Sheldon Q Shi received his PhD degree at Michigan Technological University (MTU) in 1997. He has about two years of Post-doc experience with MTU and University of Maine, five years of industrial experience with APA - The Engineered Wood Association (Tacoma, WA). In 2004, he joined Mississippi State University (MSU) as an Assistant Professor and received tenure. Seven years later, he joined the University of North Texas in Mechanical and Energy Engineering Department. He has been experienced in the manufacture processes of composite materials using biomass as feedstocks, such as wood, plant fibers, soybean, etc. He has been serving as PI and Co-PI for many federal projects supported by DOE, NSF, and USDA. He received multiple best paper awards and other research awards. He served as Executive Board of the Society of Wood Science and Technology (SWST) during 2008 – 2015, and became the President during 2013–2014. He is serving as Editorial Board Member for several journals, reviewer of more than 40 professional journals, and panel reviewer for USDA and DOE proposals. He has published over 170 papers, from which over 130 are in peer-reviewed journals.

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