RNR

U.S. Department of Agriculture **Accomplishments Report AD-421** U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions			Date (Month, Day, Year) 03/06/2012
1. Accession 0213924	Agency Identification No. 2. SAES 3. LA.B	5. Work Unit/Project No. **LAB03903**	6. Status **Annual Report**

7. Title

Extruded Wood/Natural Fiber Polymer Composites as Advanced Engineering Materials

12. Investigator Name(s) (Last Name and Initials)

Wu, Q.

20. Termination Date 06/30/2013	40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

The information generated by this project was disseminated in 2011 in a total of two refereed research publications and two presentations at national and international conferences. The significance and impact of the research were discussed with peer researchers and members of wood-based composite industry. As the result of this research, one technique of using hybrid bamboo and precipitated calcium carbonate (PCC) fillers in wood plastic composites has been described.

Outcomes/Impacts:

The influences of hybrid bamboo and precipitated calcium carbonate (PCC) fillers in a recycled polypropylene/polyethylene (R-PP/PE) matrix on the properties of bamboo plastic composites were studied. Thermogravimetric and FTIR analyses of both thermo-mechanically refined bamboo fiber (RBF) and ground bamboo particle (GBP) showed relatively higher holocellulose content in RBF and more effective silane grafting on the RBF surface. The raw PCC particles contained over 95% CC and had an agglomerated form consisting of particles with a mean diameter of about 1.2 microns. Compounding the PCC particles with the plastic resin helped separate and disperse them in the matrix. Measured flexural strength and modulus of PCC-only-filled composites increased significantly from 15 to 30% PCC content levels, while the tensile and impact strength of composites decreased with the addition of PCC. For composites with hybrid bamboo and PCC fillers, tensile and flexural moduli were improved with the increase of PCC content. After silane treatment, RBF filled composites showed noticeably increased mechanical properties compared to those of GBP filled composites. For modulus values, PCC-bamboo-polymer composites were 3-4 times higher than those of PCC-polymer composites at high PCC levels.

Publications:

Kim, BJ, F. Yao, G. Han, and Q. Wu. 2011. Performance of bamboo plastic composite with hybrid bamboo and precipitaed calcium carbonate fillers. Polymer Composites DOI 10.1002/pc.21244.

Zhou, C., R. Chou, R. Wu, and Q. Wu. 2011. Electrospun polyethylene oxide/cellulose nanocrystal composite nanofibrous mats with homogeneous and heterogeneous microstructures. Biomacromolecules: 12:2617-2625.

Participants:

Wu, Q. (PI), Y. Fei, and B.J. Kim, LSU AgCenter.

Target Audiences:

Wood/plastics composite industry, recycled plastics industry

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date
Rhyp H Ehyn		3/23/12