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My expertise is highlighted as follows:

Extensive experience on research & development of value-added polymers, polymer composites, and wood polymer composites

More than 15 years' research experience specialized in polymer synthesis, characterization, and evaluation

More than three year experience on developing green phenolic adhesives, bio-adhesives for wood composite applications

Six years' research experience on research and development of thermal resistance epoxy resin system

Six years' experience on nano-technology

Good at experimental design, data analysis through statistic approach, and interpretation of structure and property relationship of polymer materials

In the past, I have worked on several projects that involved nano-technology.

From 2003-2004, we work on the enhance the hardness and mechanical properties of solid work through impregnation of vinyl monomer and pre-polymer with nano-particles, with this technology, the hardness of mechanical properties of densified wood composites were improved.

From 2007- 2010, we conduct project fire-retardant wood composites. We adopted several approached, several approaches involving nano-technology. One approach is to us the nano-clay to modify the coating formulation and apply coating to the surface of the wood composites, such as low density fiberboard and OSB panels. Second approach is to modified the phenolic resin with different nano-particles (nano-clay, nano-alumina, nano-ZnO). We coated the OSB panels with modified phenolic resin as post-treatment, and curing at elevated temperature for short period of time. The fire performance of these panel were improved. Third approach is to treat the wood wafer and resin with nano-materials (NCC, nano-clay, nano-Al₂O₃, and nano-ZnO). We find that with these nano-materials, the fire performances were improved and mechanical properties is comparable with control panels. Based on the past few years' investigation, we made another series of OSB panels with nano-materials that show promising results.

From 2007 to 2010, we work on project (lignin and bark as raw materials for phenolic resin) in Research Element 1: Next Generation Building Solutions (Federal Strategic Investment in Forest Sector Innovation). Right now we collaborate with NRC for lignin based phenolic resin development. In 2009, we start to develop single walled carbon nano-tube phenolic resin with single walled carbon nano-tube solution supplied by NRC. The results are quite promising. NRC and FPI work together to do more work in 2010. Apart from that, we will start to try to use NCC to incorporate with resin to improve the bonding strength and other properties. In 2010, we will do more work in that area. We would like to get support from ArboraNano in the near future to work on application of NCC and other nano-materials for wood composites applications.