

Nanotechnology applied to forest sector: some researches at Embrapa Forestry

Washington Luiz Esteves Magalhães, Embrapa Florestas – Brazil -
washington.magalhaes@embrapa.br

Pedro Henrique Gonzalez de Cademartori, UFPr – Brazil

Graciela Inês Bolzon de Muniz, UFPr – Brazil

Mayara Elita Carneiro, UFPr – Brazil

Elaine Cristina Lengowski, UFPr – Brazil

Bruno Dufau Mattos, UFPr – Brazil

Tainise Vergara Lourençon, UFPr – Brazil

Lívia Cássia Viana, UFPr – Brazil

Marina Mieko Nishidate Kumode, UEPG – Brazil

Abstract

Embrapa Forestry and co-partners has extensively worked with nanotechnology applied to forest sector. The main investigations including production of nanostructures from plants – such as nanocellulose, nanolignin, and nanosilica- surface modification by plasma glow discharge, slow release of nutrients, and nanocomposites. We are able to obtain nanocelulose (fibrils or whiskers) from many sources of cellulose such as Kraft pulp and residues from forest sector. Our attentions are on applications in food packages, paper or composite reinforcement (nanocomposites), production of thin films, and modification of cellulose crystallinity by chemical and mechanical methods and it fast non-destructive prediction through chemometrics. Lignin and nanolignin has been investigated using the black liquor from Kraft pulping process. We aim developing new materials applying the lignin and nanolignin in biodegradable composites, mulching, slow release of biocides and fertilizers, electrospinning, resin additives, carbon fibers, and fine chemistry. Modification of materials' surface by plasma technology is other research area extensively explored in Embrapa Forestry. Activation and coating of wood and wood-based products using different gases and vapor of chemical products, and hardening of band saws through TiN_x deposition are the main applications investigated by our research group. Activation and coating of the materials allow the obtaining of hydrophobic or hydrophilic surfaces, while hardening of bandsaws aims at increasing its durability in service. Slow release and composites topics including the application of nanocellulose, nanolignin, and nanostructures from forest raw materials. Our investigations focusing slow release of KCl, application of nanosilica in wood-based products, application of cellulose, lignin and their nanostructures as reinforcement or filler in composites.