

PROGRESS AND PLANS OF NATIONAL NANOTECHNOLOGY INITIATIVE (NNI) AGENCIES

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U.S. Department of Agriculture (USDA)¹

Forest Service (FS)

Summary

Forest Service nanotechnology research supports departmental and agency priorities to facilitate rural prosperity and economic development, ensure productive and sustainable use of our National Forest System lands, and strengthen the stewardship of private lands through research and development. The primary focus of Forest Service nanotechnology research is on producing cellulose nanomaterials from wood, and developing the science and technology for the application of cellulose nanomaterials in a broad range of products. Other nanotechnology research in the Forest Service includes understanding the nanostructure of wood and wood properties and wood-water interactions with nanotechnology techniques.

Plans and Priorities by Program Component Area (PCA)

PCA 3. Nanotechnology-Enabled Applications, Devices, and Systems

Most Forest Service R&D nanotechnology investments are in the manufacturing and development of science and technology for new products with cellulose nanomaterials. Partnering with the public-private partnership P³Nano, research and development priorities are to invest in previously funded projects deemed to have commercialization potential by industry experts.

Forest Service experts will continue to participate in cellulose nanomaterials international standards developments projects.

Key Technical Accomplishments by NNI Goal

Goal 1. Advance a World-Class Nanotechnology Research and Development Program

Forest Service continues to partner with P³Nano, a public-private partnership between the Forest Service and the U.S. Endowment for Forests and Communities, to develop technologies that have shown promising results from previous laboratory research. Besides demonstrating strength enhancement and greenhouse gas reduction with cellulose nanomaterials in a test pour for the Moffett Creek Bridge in Siskiyou County California, research on the addition of cellulose nanomaterials to fiberglass reinforced polymers has shown promising results. Initial findings from the research team consisting of the Forest Service Forest Products Laboratory, Georgia Tech, and an industrial partner estimated that the addition of cellulose nanomaterials

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in fiberglass-reinforced composites can allow a 7% weight reduction while maintaining mechanical properties for automobile materials.

Goal 2. Foster the Transfer of New Technologies into Products for Commercial and Public Benefit

Forest Service experts have participated in cellulose nanomaterials projects in ISO TC 229 (Nanotechnologies), ISO TC 6 (Paper, board and pulps), and other standards development organizations.

Forest Service supported the organization of the Advanced Commercialization of Nanocellulose: Critical Challenges Workshop, held on May 7–8, 2019. This industry-led workshop was a follow-up to the 2014 FS-NNI A Path Towards Commercialization Workshop² and supported the NNI Nanomanufacturing Signature Initiative. A workshop report was published in the spring of 2020.³

² https://www.fpl.fs.fed.us/documnts/pdf2014/usforestservice_nih_2014_cellulose_nano_workshop_report.pdf

³ https://www.appti.org/uploads/1/1/0/6/110618311/nanocellulose_critical_challenges_workshop_report_final.pdf