Additive Nanomanufacturing and Dry Printing

Auburn University is seeking a licensee or development partner for a technology that enables dry printing of functional hybrid materials and devices through on-demand nanoparticle formation and real-time sintering.

Overview: Additive manufacturing (commonly called 3D printing) is revolutionizing how we create materials. More complex products can be produced faster and cheaper than with traditional manufacturing. Auburn University's new technique allows on-demand creation of different nanoparticles as building blocks to create hybrid functional structures and devices. Additionally, the device can print onto various rigid and flexible surfaces. Combining the versatile fabrication of additive nanomanufacturing with the unique properties of multifunctional materials can produce novel applications for biomedical, aerospace, and electronics industries. This technology has the potential to transform or replace traditional additive printing processes, such as ink and aerosol jet printing.

Advantages:
- NANOSCALE - Nanoparticle building blocks are generated on-demand and in real-time
- PRECISE - Controlled laser pulses enable precise layer-by-layer deposition and sintering
- VERSATILE - Can produce different multifunctional materials and hybrid structures

Description: Auburn's additive nanomanufacturing process creates various nanomaterials in real-time. Nanoparticles form when part of a target is vaporized with a laser and interacts with background gases within the instrument. The type of target or gas used controls the composition of the nanoparticles. After forming, a stream of particles flows out of the synthesis chamber and onto a substrate. A second laser sinters the nanoparticles in real-time as they land. Printing can be done on various types of surfaces, including curved and flexible substrates. As nanoparticles exit the chamber, they pass through a nozzle. Adjusting the size of the nozzle hole can alter the width of a printed line. Layer thickness is controlled by the number of nanoparticles formed, which increases the longer the laser interacts with the target. By using nanoparticles as our building blocks, we work with and create a variety of multifunctional and hybrid materials, structures, and devices.

Status:
- Subject of published US patent application 20200391405 and associated PCT application
- This technology is available for exclusive or non-exclusive licensing
- Various materials including TiO2, ZnO, Ag, Cu, and ITO nanoparticles have been fabricated and the prototype has been used to create flexible hybrid electronics.