

---

## UTILIZATION OF ELECTROSPINNING TECHNIQUE TO DECORATE NANOFIBERS FOR BIOMEDICAL APPLICATIONS

Heidi Reid, Montana Tech- Undergraduate Research Program, Montana Tech of the University of Montana, Butte MT. 59701

Hydroxyapatite has long been recognized for its biocompatible properties. Because a modified form of this substance is found in up to 80% of human bone, the human immune system does not recognize it as foreign and therefore does not initiate an immune system attack. Hydroxyapatite has been used as scaffolding for bone repair, as well as for coating metallic implants. Additionally, hydroxyapatite has the ability to promote bone growth without dissolving in the human system. This substance presents great potential for treatment and repair applications in a physiological system.

Although hydroxyapatite has been demonstrated to have great biological applications, these applications all require a substrate for administration. Electrospinning technique provides technology for creating such a substrate. Electrospinning has been used to create drug delivery systems and scaffolds for tissue regeneration. The electrospinner manufactures tiny nano- or micro-sized fibers and when these nanofibers are layered, a thick nanofiber mesh results. This nanofiber mesh provides a surface for hydroxyapatite nanoparticle attachment.

In addition to electrospinning technique, the electrospinner also has the capabilities to “electrospray,” or to create individual nanoparticles laid down on a metal collector plate. In

my research, I intend to electrospin a fiber mesh, and then use electrospraying to decorate the mesh with iron-doped hydroxyapatite nanoparticles. This endeavor involves the development and characterization of fabrication techniques for biomedical applications.