

Apr 11th, 8:20 AM - 8:35 AM

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Recommended Citation

Elumalai, Anusha; Luo, Yangyang; Humayun, Ahmed; and Mills, David K., "The Strontium-Coated Clay Nanoparticles in Calcium Phosphate Cement for Biomedical Applications" (2019). *ANS Research Symposium*. 7.
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The Strontium-Coated Clay Nanoparticles in Calcium Phosphate Cement for Biomedical Applications

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The use of strontium (Sr) for bone regeneration has garnered interest over the past few years due to its beneficial properties in treating bone loss associated with osteoporosis. Sr and calcium share many chemical similarities. Incorporating Sr nanoparticles in bone tissue results in bone strengthening, induction of bone formation by osteoblasts and reduction of bone reabsorption by osteoclasts. In this project, we coated halloysite (HNT) using strontium carbonate (SrHNT) in a single step process without the use of harmful chemicals or the production of toxic waste. To analyze the SrHNT coatings we used Scanning Electron Microscopy (SEM), Fourier-Transformed Infrared spectroscopy (FTIR) and EDX to confirm the presence of Sr on HNT surface. We further tested the antibacterial properties of Sr coated HNTs on *Escherichia coli* and *Staphylococcus aureus* by the micro-titration method. We then assessed any potential cytotoxicity of our SrHNTs on a pre-osteoblast cell line (MC 3T3). Further tests were to determine SrHNT effects of cell proliferation and osteogenesis. We are still at the preliminary testing phase of our Sr coated HNTs, however, our results to date indicate that we have successfully coated strontium onto the HNT surfaces, on a small and large scale by a one-step method. Embedding these Sr nanoparticles in calcium phosphate paste may enhance the biocompatibility, antimicrobial properties, osteoinductivity, osteoconductivity, and biodegradability of the paste.