On the Synthesis of Hydroxyapatite Nanoparticles From Eggshells via the Sol-Gel Method

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Around one in five people worldwide are diagnosed with Osteoporosis, a disease that causes gradual loss of bone mass leading to increased risk of fractures, drastically reducing life expectancy. Hydroxyapatite [Ca10(PO4)6(OH)2], more commonly referred to as HAp, is a compound gaining increasing attention in the Biochemical and Medical fields due to its high osteocompatibility and surface area, making it ideal for treating this disease; moreover, it can be used to coat implants to stop the body from attacking foreign material. In this novel testing of HAp synthesis, eggshells were used as the calcium carbonate source and diammonium phosphate as the phosphate group. Through repeated trials, the optimal HAp initial reaction time was found for nanocrystal width, conductivity, hardness, and yield. Overall, the best trial produced ~46.82 g of nanoparticles with a width of around 80 nm with ~98% purity at the cost of only $15 compared to the average cost for implants of $3500. Ultimately, this product can be scaled for distribution in economically developing areas at a much lower cost than previously developed.

Awards Won:

NC State College of Engineering: Scholarship to attend NC State Engineering Summer Camp