Our research aims to synthetically fabricate enamel, the hardest tissue in our body. Our goal is to mimic natural enamel formation using a 56 amino-acid product of amelogenin, leucine-rich amelogenin peptide (LRAP), to regulate hydroxyapatite (HAp) crystal shape and orientation. Here, we present a preliminary finding of our synthetic HAp product compared to porcine enamel samples. While the ratios of Ca: PO₄ in our product and the porcine enamel are similar, the patterns by scanning electron microscopy are quite different, likely due to the absence of LRAP. Furthermore, we plan to produce and purify LRAP in bacteria, hoping to enhance the HAp structure and make it more similar to natural enamel. Our ultimate goal is to combine LRAP and HAp and implement it in a user-friendly product such as toothpaste or mouthwash.