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Mechanical evaluation of polylactic acid (PLA) with nominal Hydroxyapatite filler for use in biomedical implants

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An active area of research in the biomedical implant field is poly lactic acid (PLA). Polylactic acid is very interesting material for this field because it is a biocompatible and biodegradable material. One downside to using Polylactic acid PLA in biomedical implants is that its mechanical strength is much lower than that of its metal counterparts. However polylactic acid's many material attributes such as being biocompatibility and biodegradability make it a very promising and useful material if the mechanical properties were increased. In attempt to increase the bending strength of the Polylactic acid a Hydroxyapatite filler was used. A mold was fabricated and samples were made using the heating press method. The samples were then test under three point bending to determine their bending strength using ASTM standard D5023-07. Polylactic acid (PLA) was tested ranging from zero percent Hydroxyapatite filler to five percent Hydroxyapatite filler. Pure polylactic acid PLA was used as a base for comparisons. From these tests to date the polylactic acid has shown a significant improvement in bending strength. This is a very promising result for polylactic acid's future in the biomedical field. Furthermore if it can be demonstrated that similar increases in bending strength in our polylactic acid samples can be demonstrated in actual bone screws or plates the increase in mechanical properties would have numerous implications for polylactic acid in the biomedical field.