Valorization of Using Animal Bones to Produce 3D Printer Filament

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Different types of 3D printing filaments have been recently used. One of the most commonly used filaments is PET (Polyethylene Terephthalate) along with ABS (Acrylonitrile butadiene styrene) filaments. However, these filaments are non-biodegradable and require a lot of energy. Innovations developed biodegradable and environment-friendly filaments, made from recycled materials. These can be an alternative to plastic filaments. As known, animal bones are wasted resources, and their amounts increase with the increase in population. Annually around 130 billion kg is generated around the world from animal bone waste. The slaughtering of each animal generates approximately 18% of its total live weight. This project aimed to convert the wasted resources - BONES - into useful materials through an eco-friendly process, and to decrease the global demand for plastic in 3D printing. The filament is made of 55% of wasted animal bones and 45% polylactic acid (PLA). After many chemical operations, the mixture has been well homogenized to produce a biodegradable, affordable, and safe product for the environment. The filaments are with tensile strengths of (28.07-28.09) Mpa, about (5.13- 6.03) elongation, a density of (1.079-1.132) g\cm3, a melting point between (139.3-204.7) Cº and a diameter of (1.75±0.02) mm. According to the study, 3D Printing is successfully manufactured utilizing the created filament, and the use of animal bones (Chicken and livestock bones) and polylactic acid emphasizes the significance of environmental awareness. The creation of high-strength and functional filaments for industry using this novel technology will advance the advancement of 3D printer filaments.

Awards Won:
Fourth Award of $500