

The effect of PLA/PVA composition in FDM filament towards porosity behavior for medical applications

Abstract

Nowadays, the use of PLA/PVA composites is expanding in medical fields where personalized products are the best way to accommodate human anthropometric differences. Therefore, new materials are being developed to suit the needs for such applications. However, the material used to create porous structures for 3D printing remains a mystery. In this paper, researchers present a PLA/PVA composition to investigate its porosity factor for the purpose of fabricating a 3D filament for external use in medical applications such as splinting devices. For comparison, compositions were processed using the melt blending method with various PLA/PVA proportions: 70/30, 60/40, 50/50, and 100 percent PLA. Increasing the PVA content of the composition could be a factor in increasing porosity. In this analysis, different percentages of PLA and PVA were used in the compositions. The melting temperature was set at 200°C, and the composition's parameters were modified to increase the amount of PVA content by 30 percent, 40 percent, and 50 percent. Ultimately, 100% PLA was used to compare various proportions of PVA to achieve a better porous structure. The best outcome was observed at 50% due to the more PVA content. The water submerge process was successfully conducted to investigate the composition's porosity improvement.