

# Effect of Chemical Pretreatment on Properties of Rice Husk Reinforced Composites for 3D Printing

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## **Abstract**

Rice husk is a residual biomass that results from rice grain processing and disposing it is a challenging task. Currently rice husk is being used for gasification and combustion purposes, but these methods increase carbon footprint and contribute towards greenhouse gas production. We developed a method to utilize rice husk fibers in producing natural fiber composite filaments (NFRC). Three pretreatment methods, single stage dilute acid hydrolysis, two stage acid hydrolysis and two stage acid hydrolysis and alkali treatment, were investigated. The treated fibers were mixed with thermoplastic copolyester elastomer matrix with 10 wt.% loading. The compounded mixture was chopped and extruded into 3D printing filaments which were then analyzed for mechanical properties and surface morphology. Printing parameters of the filament were optimized, and mechanical properties of printed parts were investigated. Thermal and rheology properties on the composites were also analyzed. This reinforcement composite was investigated to enhance the mechanical properties of composite filaments while increasing sustainability and decreasing carbon footprint of printed parts.

## **Biography of Presenter**

Athira Nair Surendran joined University of Louisville as a PhD student in 2020 and have been working on pretreatment of different types of biomasses to be utilized in 3D printing filaments and ink printing of supercapacitor electrodes. She finished her B.S. and M.S. at Purdue University Northwest in Mechanical Engineering. She won first prize award in the inaugural Kentucky Soybean Board Soy Innovation Challenge where she proposed making electrodes using soy based activated carbon. She also won third place in Conn Center's 3 Minute Thesis presentations.

