

Supplementary Materials: Heterogeneous acid catalytic filaments for three-dimensional printing: preparation, characterization, and reduction of free fatty acids in crude palm oil

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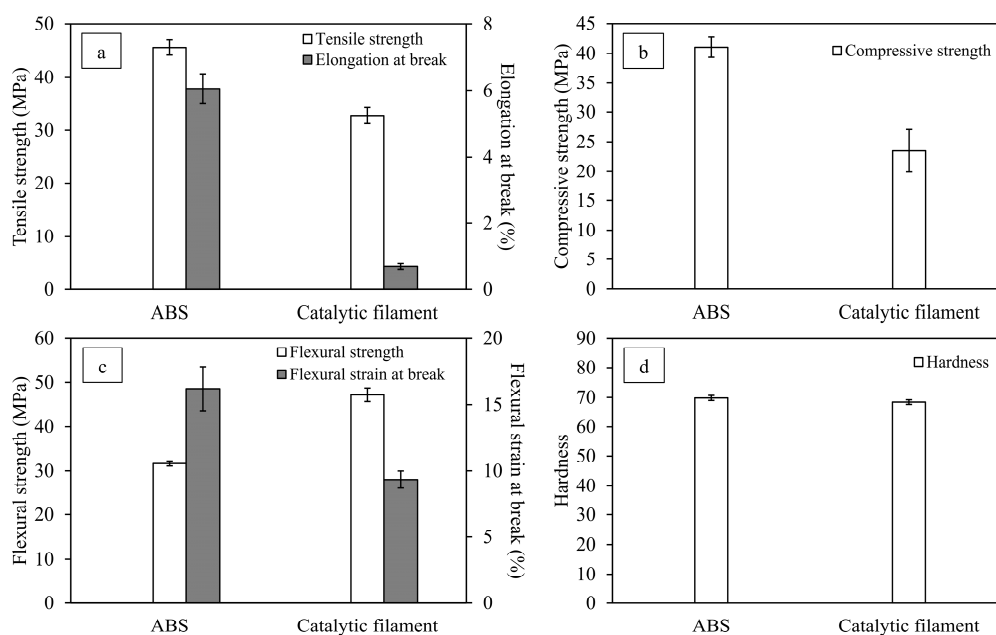


Figure S1. Mechanical properties of ABS and Amberlyst-15/ABS catalytic filaments: (a) tensile strength and elongation at break, (b) compressive strength, (c) flexural strength and flexural strain at break, and (d) hardness.

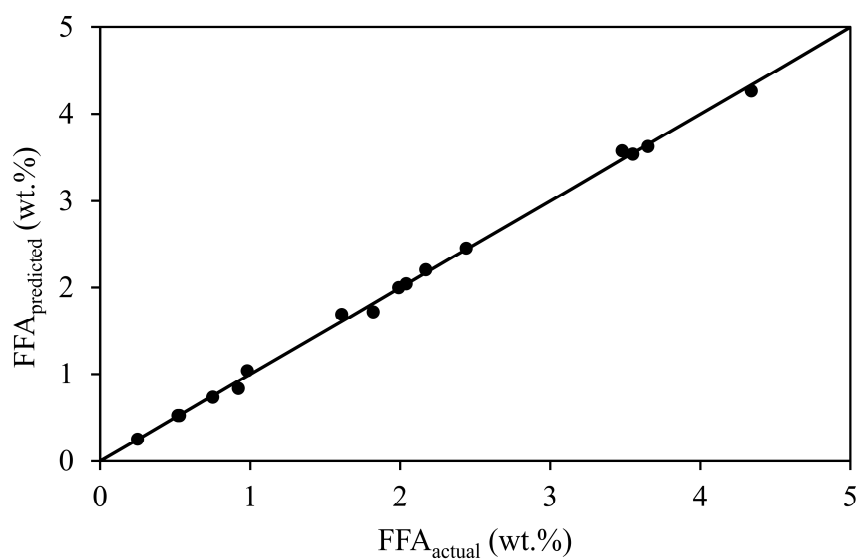


Figure S2. Relationship between predicted and actual experimental FFA values.

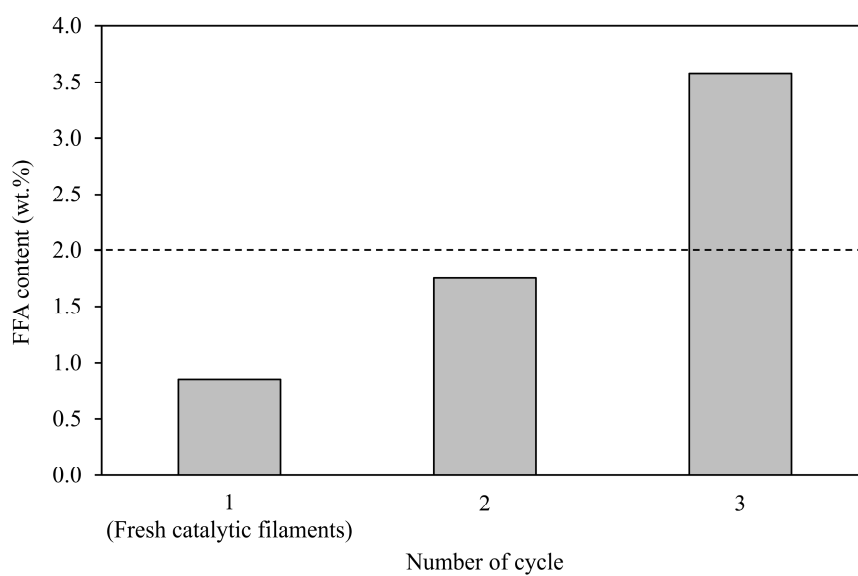


Figure S3. FFA content in ECPO during the esterification process using fresh and recycled Amberlyst-15/ABS catalytic filaments after the second and third reaction cycles.

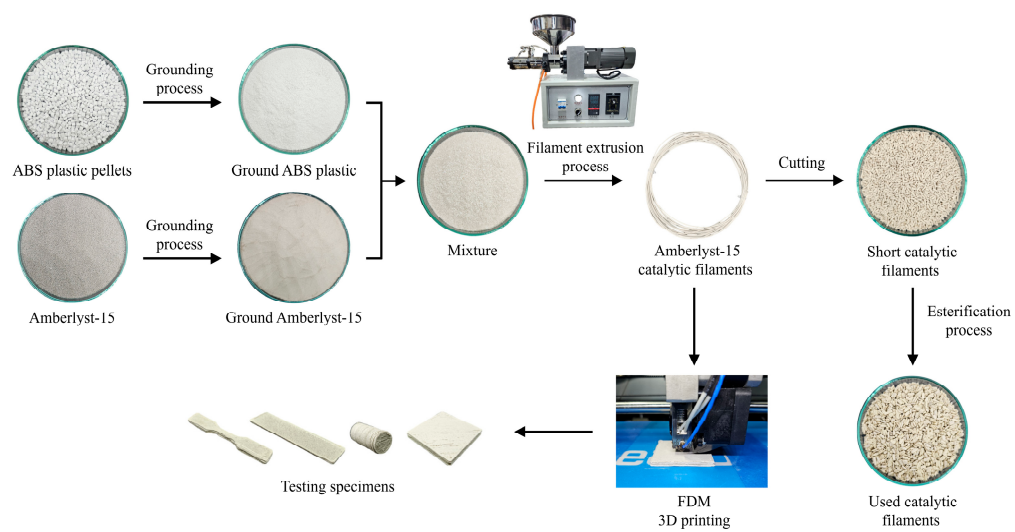


Figure S4. Preparation of Amberlyst-15/ABS catalytic filaments for 3D printing.