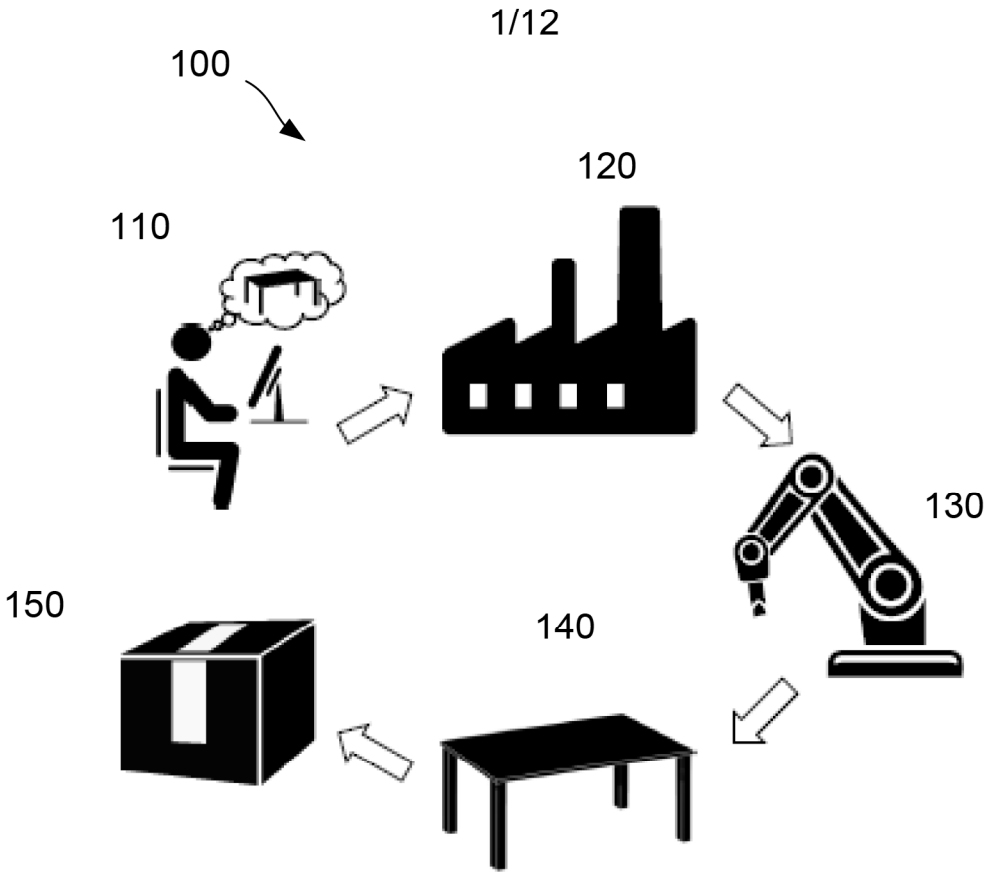



FIG 1

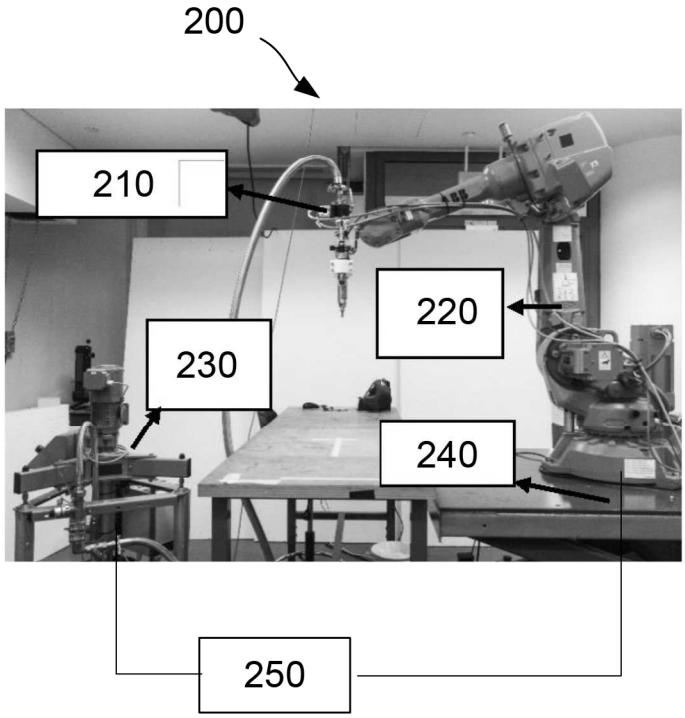



FIG 2

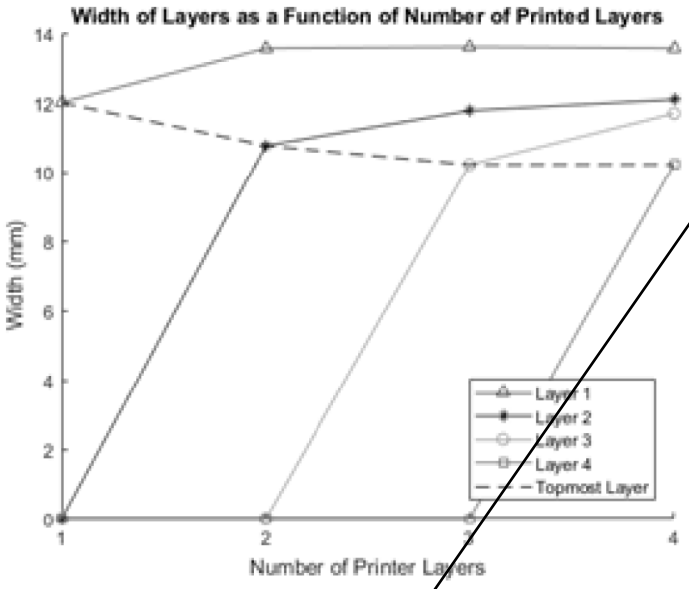

Width of Layers as a Function of Number of Printed Layers
Width (mm)
Number of Printer Layers
Layer 1
Layer 2
Layer 3
Layer 4
Topmost Layer

FIG 3A

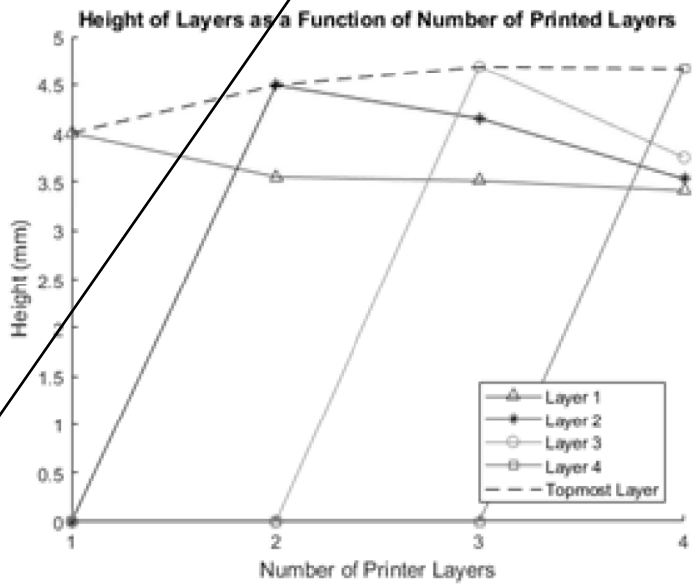

Height of Layers as a Function of Number of Printed Layers
Height (mm)
Number of Printer Layers
Layer 1
Layer 2
Layer 3
Layer 4
Topmost Layer

FIG 3B

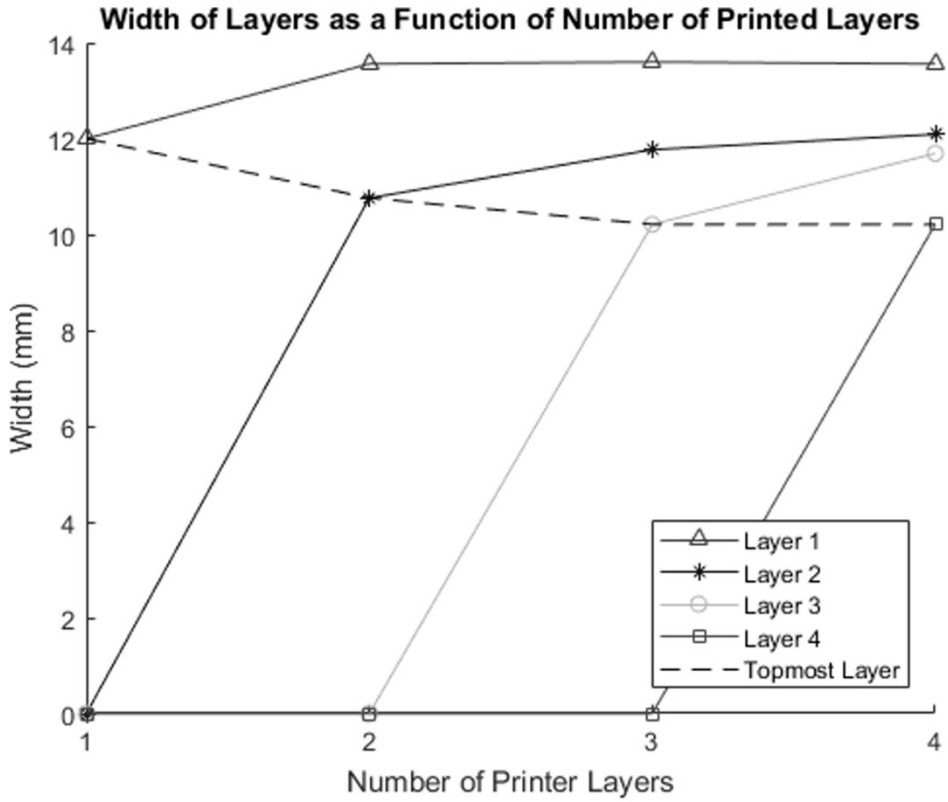

Width of Layers as a Function of Number of Printed Layers
Width (mm)
Number of Printer Layers
Layer 1
Layer 2
Layer 3
Layer 4
Topmost Layer

FIG 3A

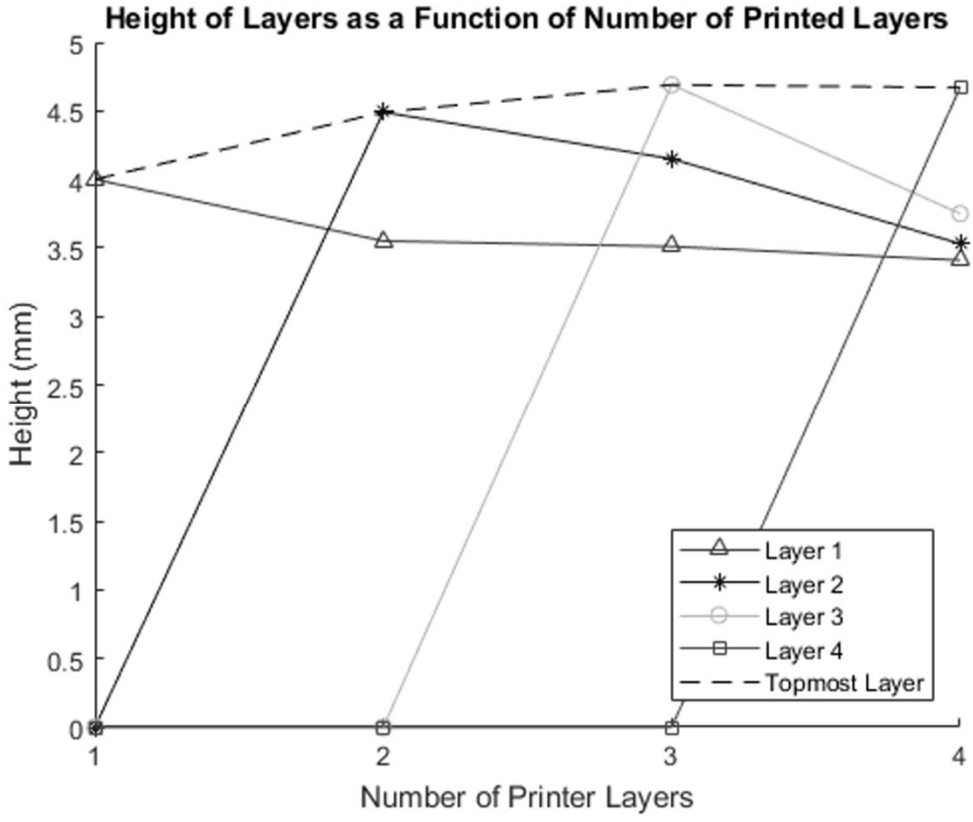

Height of Layers as a Function of Number of Printed Layers
Height (mm)
Number of Printer Layers
Layer 1
Layer 2
Layer 3
Layer 4
Topmost Layer

FIG 3B

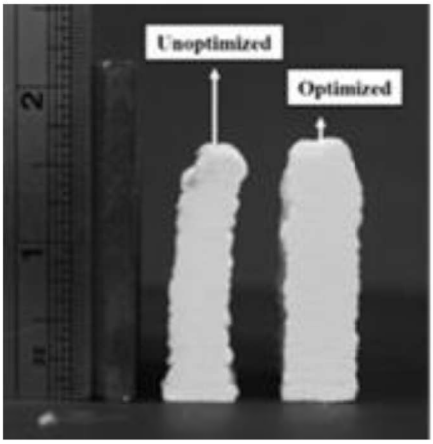



FIG 4A

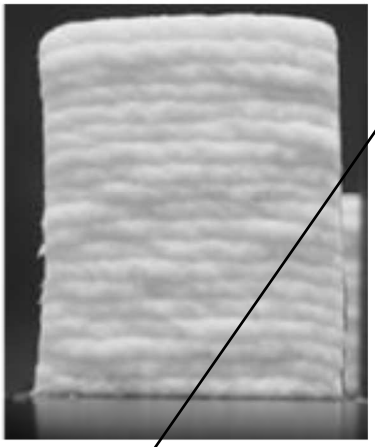


FIG 4B

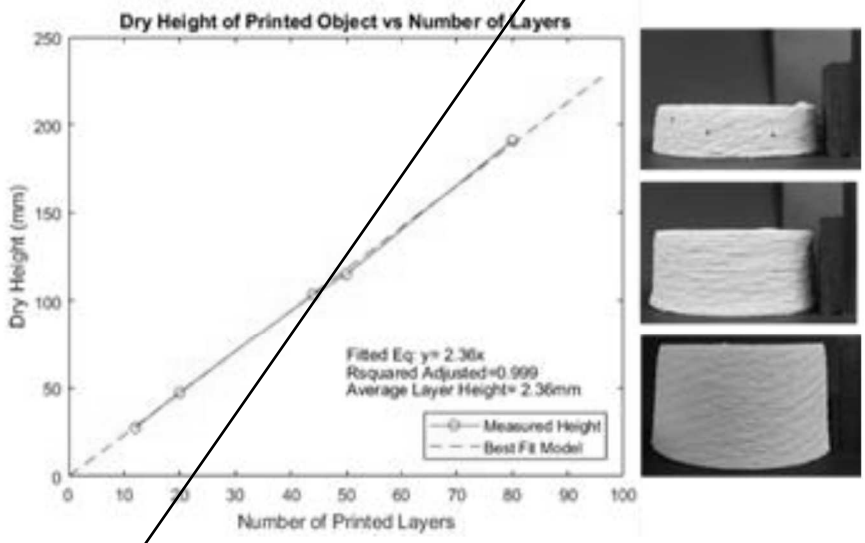



FIG 5

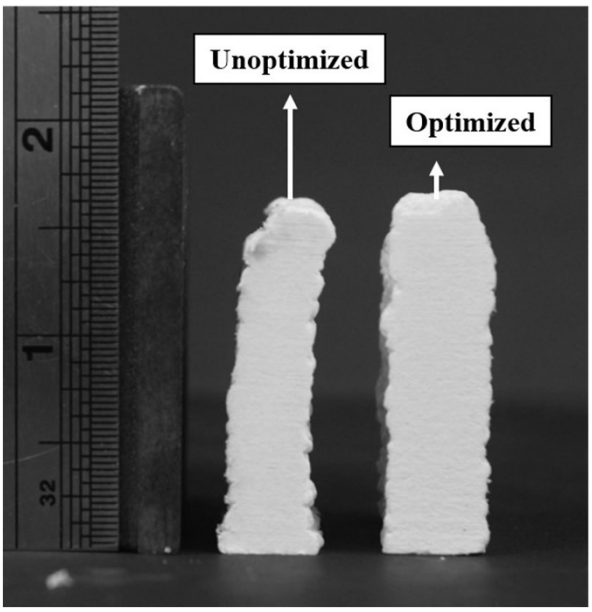



FIG 4A

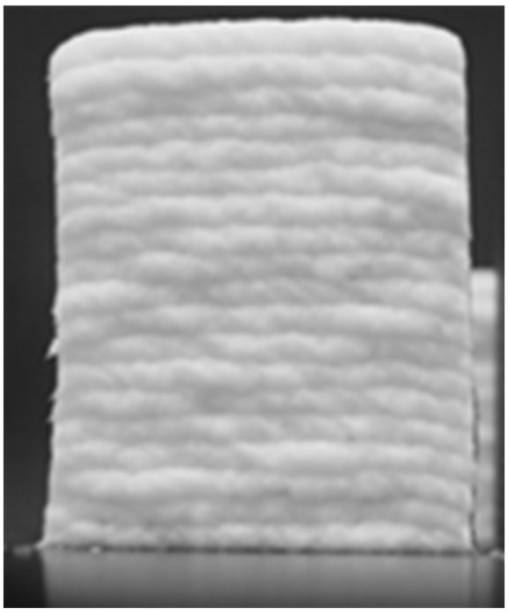


FIG 4B

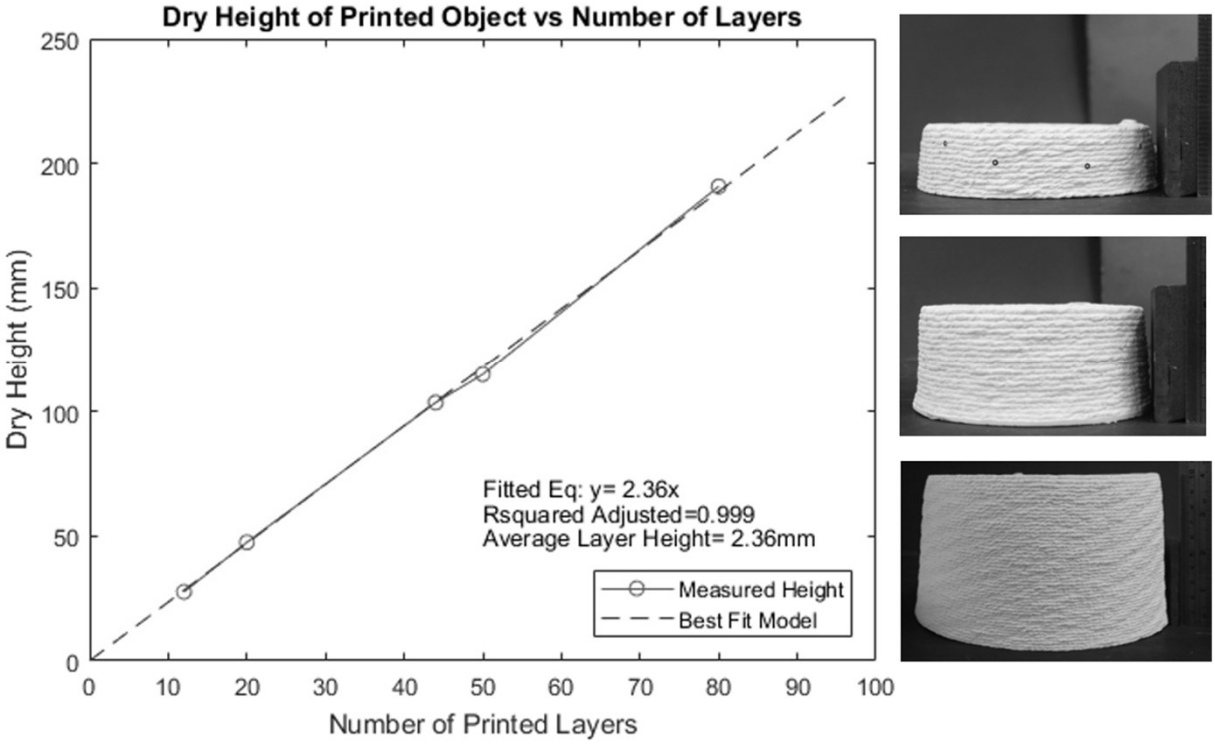



FIG 5

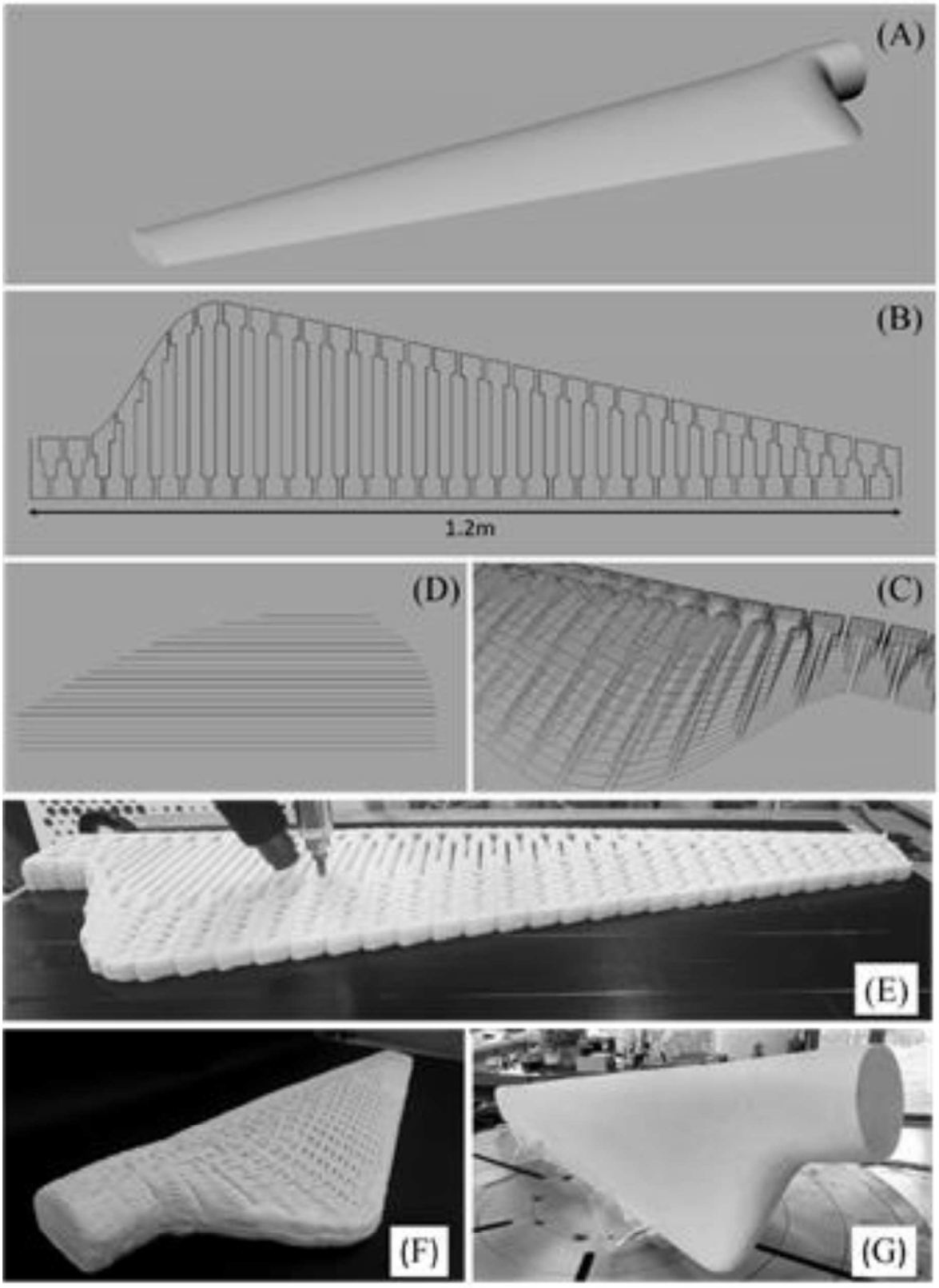



FIG 6

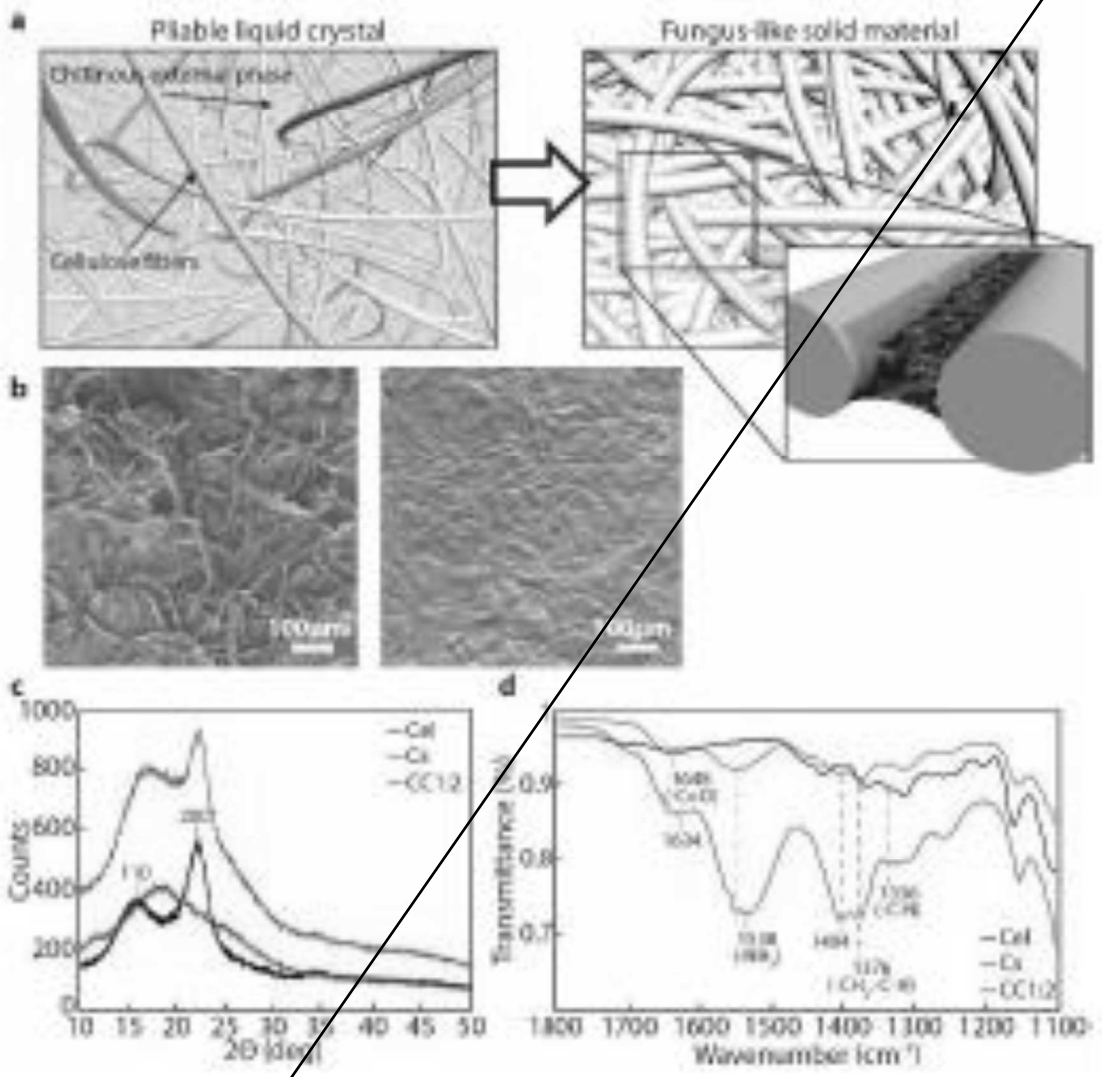

a
Pliable liquid crystal
Fungus-like solid material
Chitosan external phase
Cellulose fibers
b
100μm
100μm
c
Counts
2θ (deg)
Cel
Cs
CC12
d
Transmittance
Wavenumber (cm⁻¹)
Cel
Cs
CC12

FIG 7

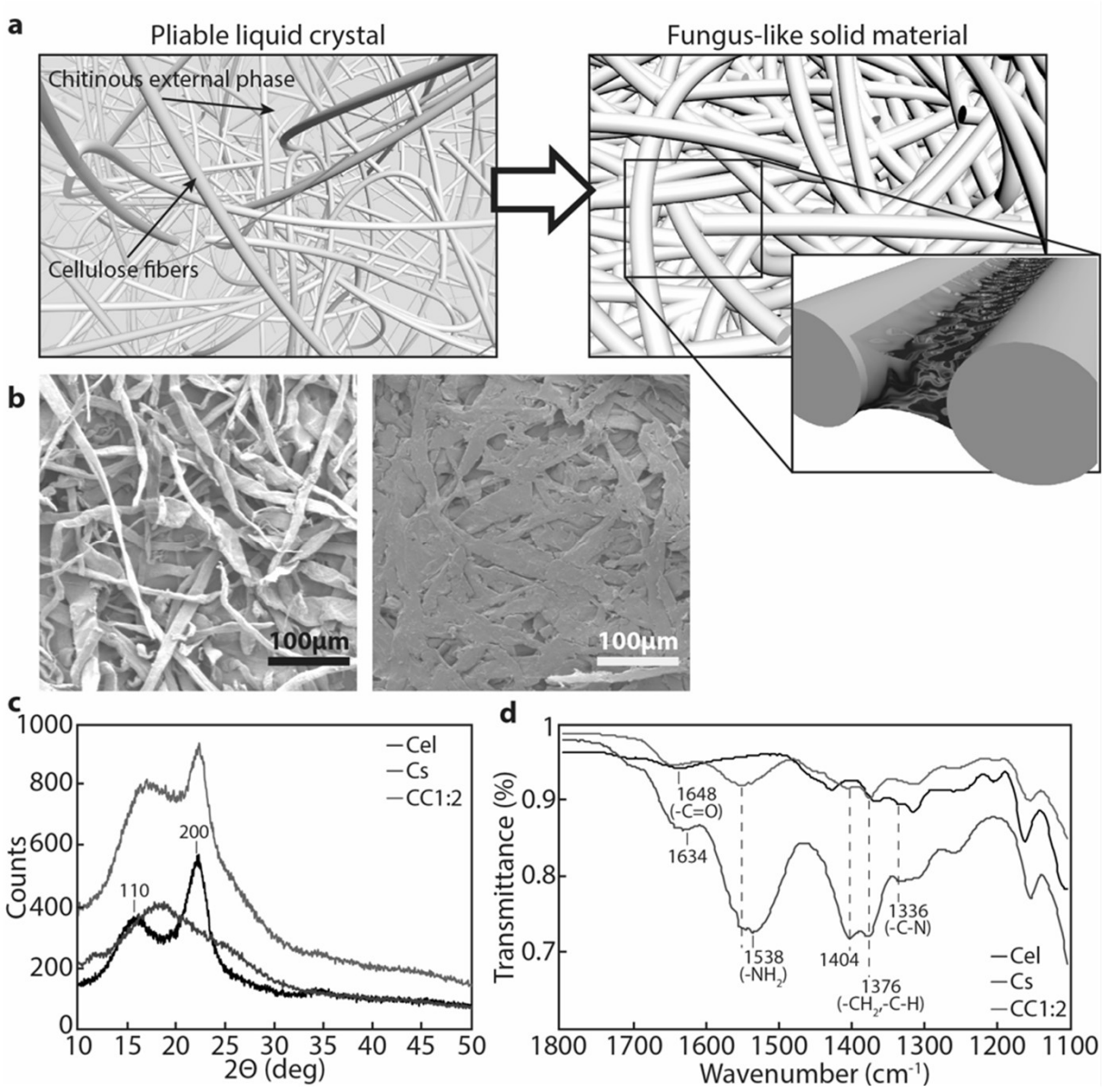

a
Pliable liquid crystal
Fungus-like solid material
Chitinous external phase
Cellulose fibers
b
100µm
100µm
c
Counts
2Θ (deg)
Cel
Cs
CC1:2
110
200
d
Transmittance (%)
Wavenumber (cm-1)
1648
(-C=O)
1634
1538
(-NH2)
1404
1376
(-CH2,-C-H)
1336
(-C-N)
Cel
Cs
CC1:2

**FIG 7**

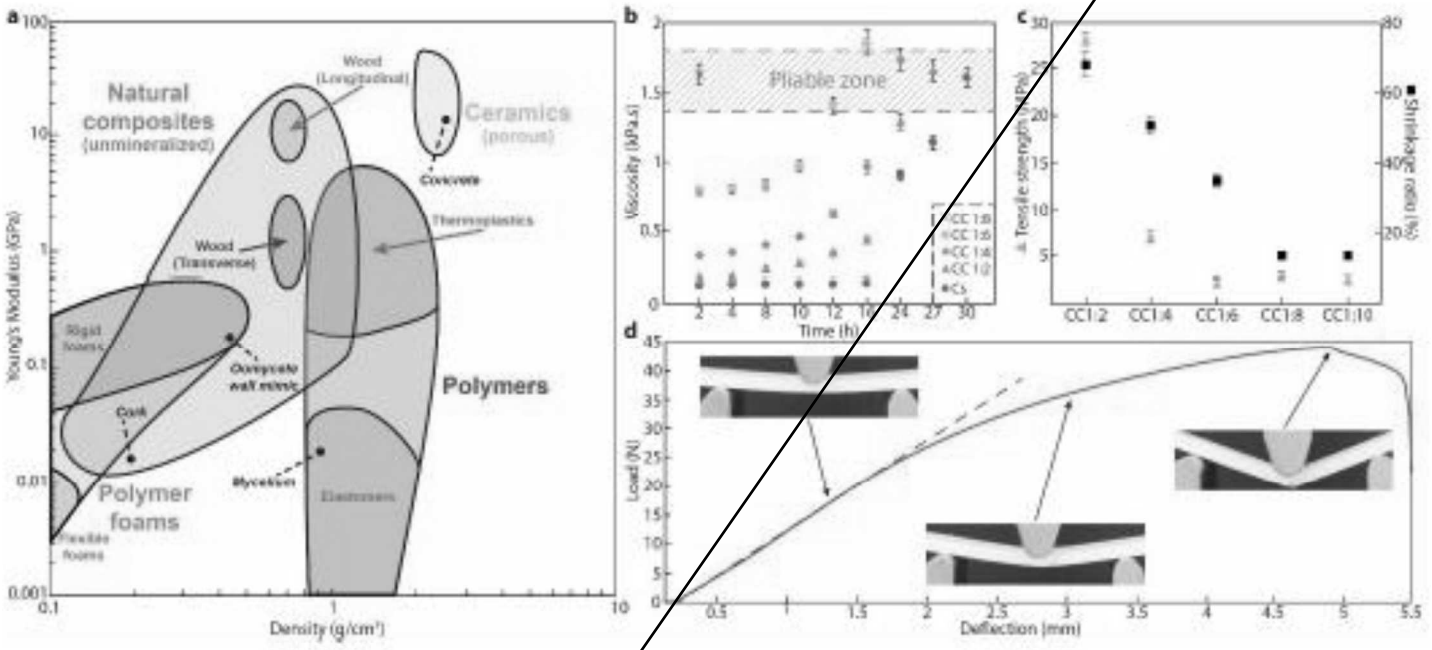

a
Natural composites (unmineralized)
Wood (Longitudinal)
Ceramics (porous)
Concrete
Wood (Transverse)
Thermoplastics
Polymers
Cork
Polymer foams
Young's Modulus (GPa)
Density (g/cm³)
b
Pliable zone
Viscosity (kPa.s)
Time (h)
c
Tensile strength (MPa)
Shrinkage ratio (%)
CC1:2
CC1:4
CC1:6
CC1:8
CC1:10
d
Load (N)
Deflection (mm)

**FIG 8**

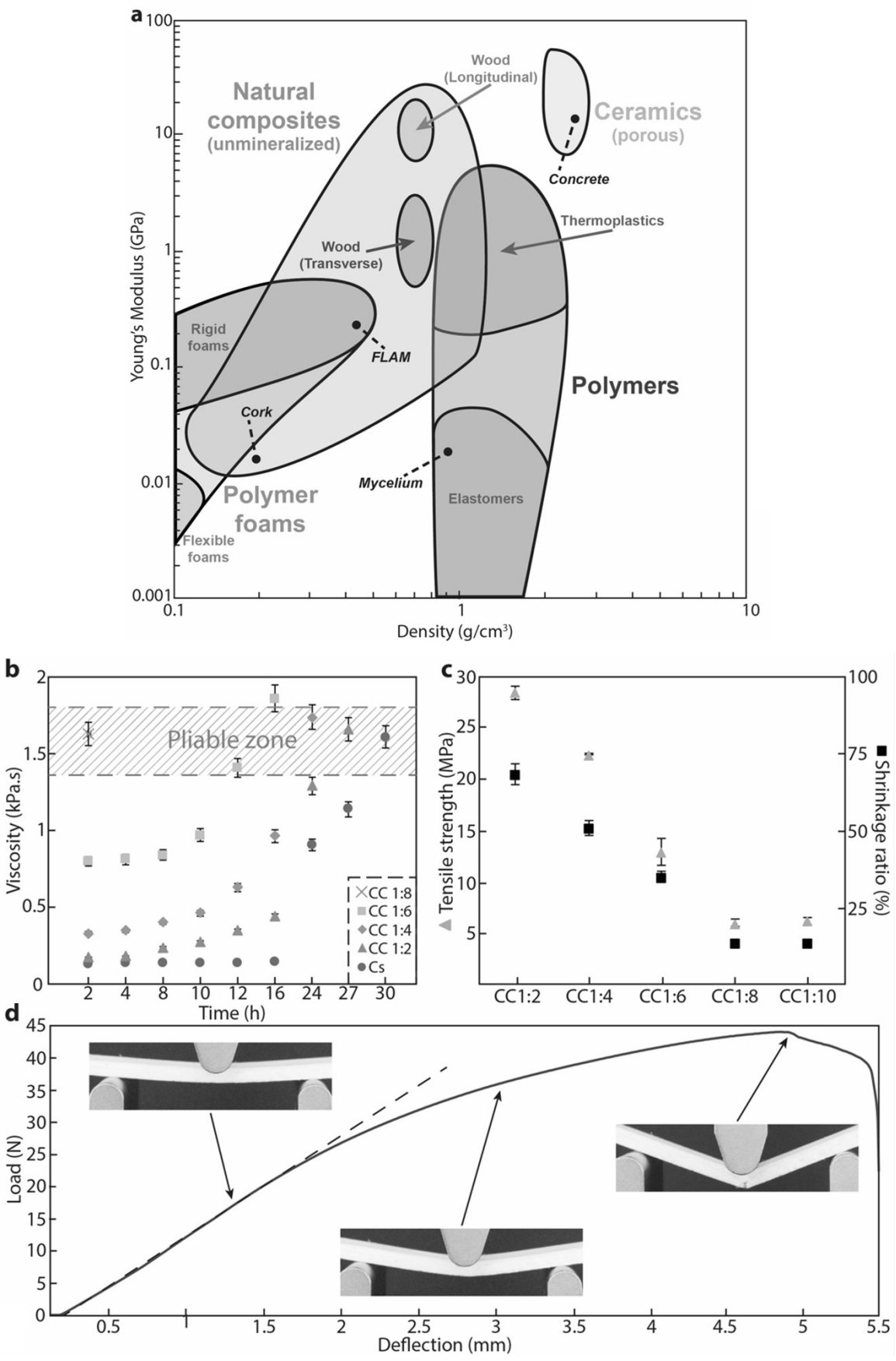

a
Young's Modulus (GPa)
Density (g/cm³)
Natural composites (unmineralized)
Wood (Longitudinal)
Wood (Transverse)
Ceramics (porous)
Concrete
Thermoplastics
Rigid foams
FLAM
Polymers
Cork
Mycelium
Elastomers
Polymer foams
Flexible foams
b
Viscosity (kPa.s)
Time (h)
Pliable zone
CC 1:8
CC 1:6
CC 1:4
CC 1:2
Cs
c
Tensile strength (MPa)
Shrinkage ratio (%)
CC1:2
CC1:4
CC1:6
CC1:8
CC1:10
d
Load (N)
Deflection (mm)

**FIG 8**

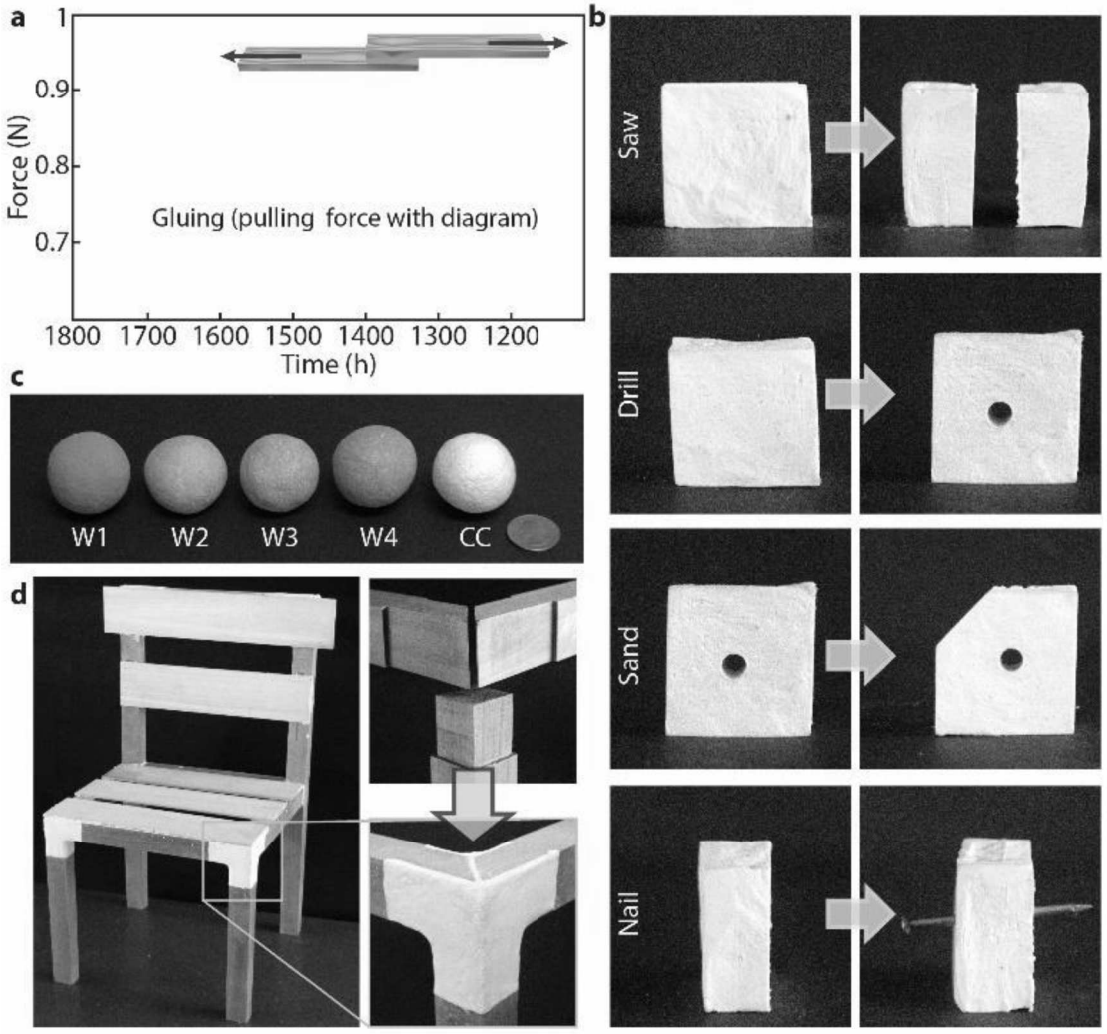

a
1
0.9
0.8
0.7
Force (N)
Gluing (pulling force with diagram)
1800 1700 1600 1500 1400 1300 1200
Time (h)
b
Saw
Drill
Sand
Nail
c
W1
W2
W3
W4
CC
d

FIG 9

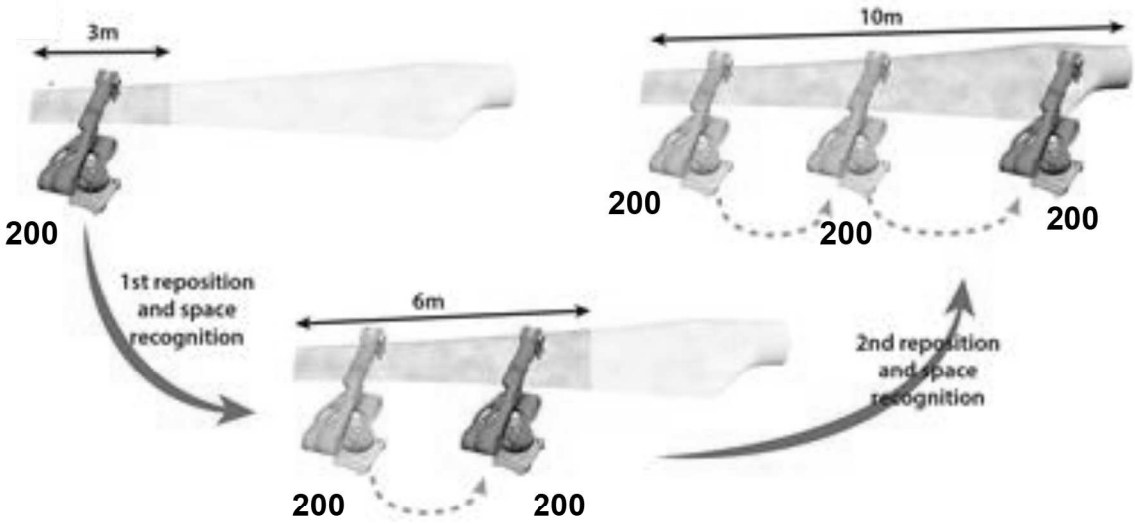

3m
200
1st reposition
and space
recognition
6m
200
200
2nd reposition
and space
recognition
10m
200
200
200

FIG 10

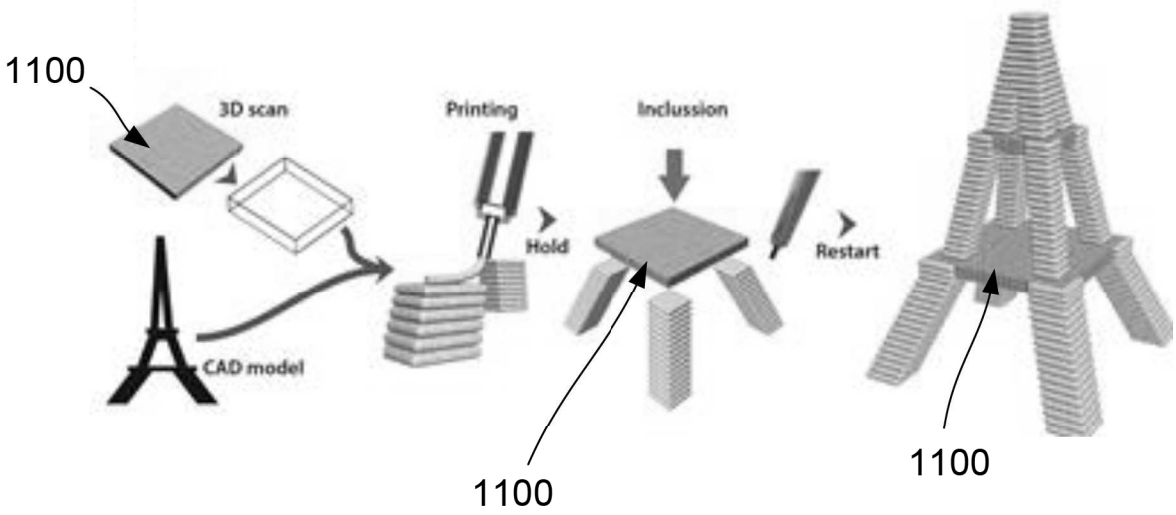

1100
3D scan
CAD model
Printing
Hold
Inclussion
Restart
1100
1100

FIG 11

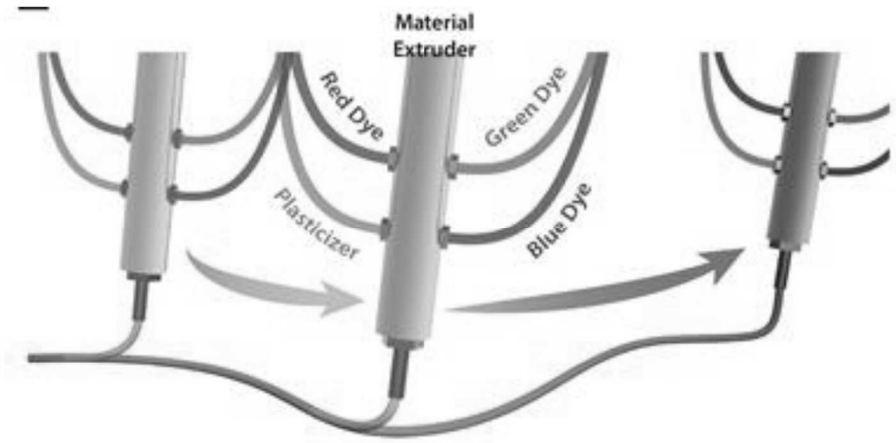



FIG 12

FIG 13A

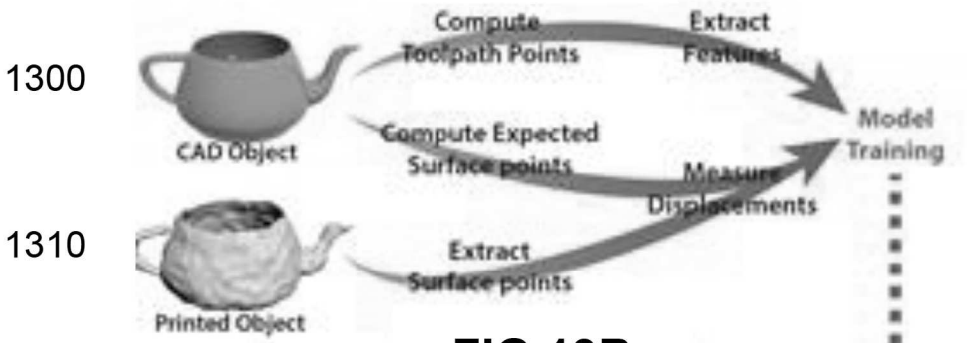
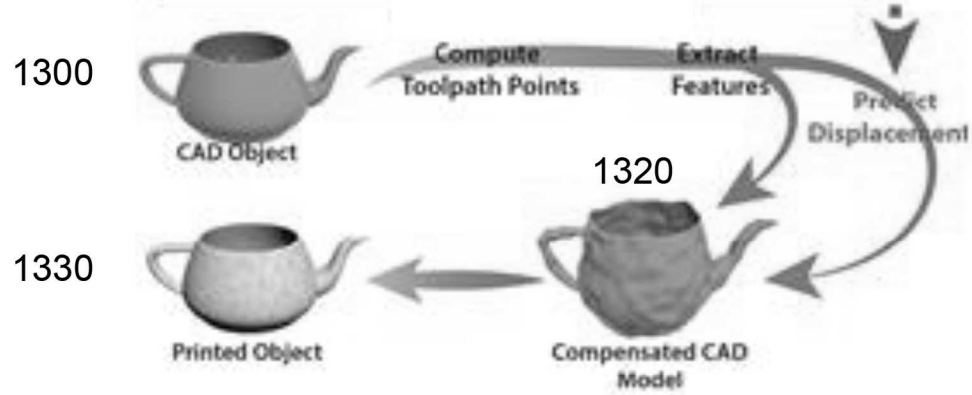



FIG 13B



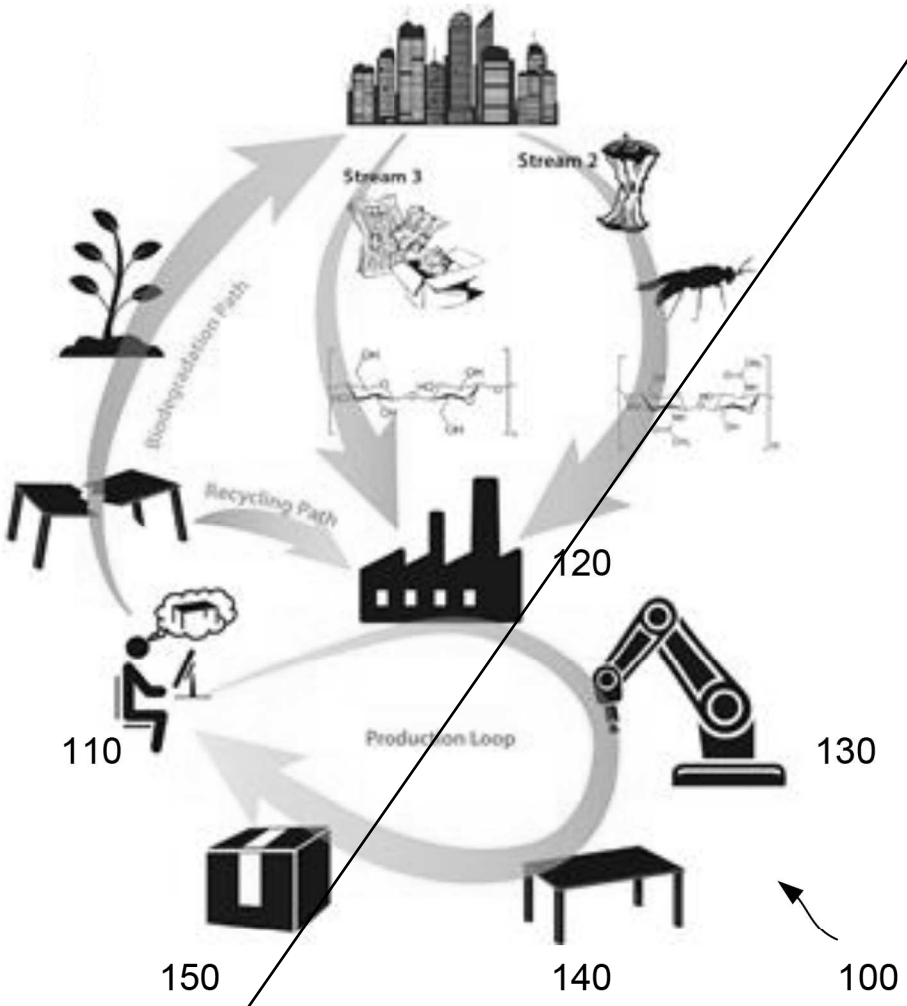

Stream 3
Stream 2
Biodegradation Path
Recycling Path
Production Loop
120
110
130
150
140
100

**FIG 14**

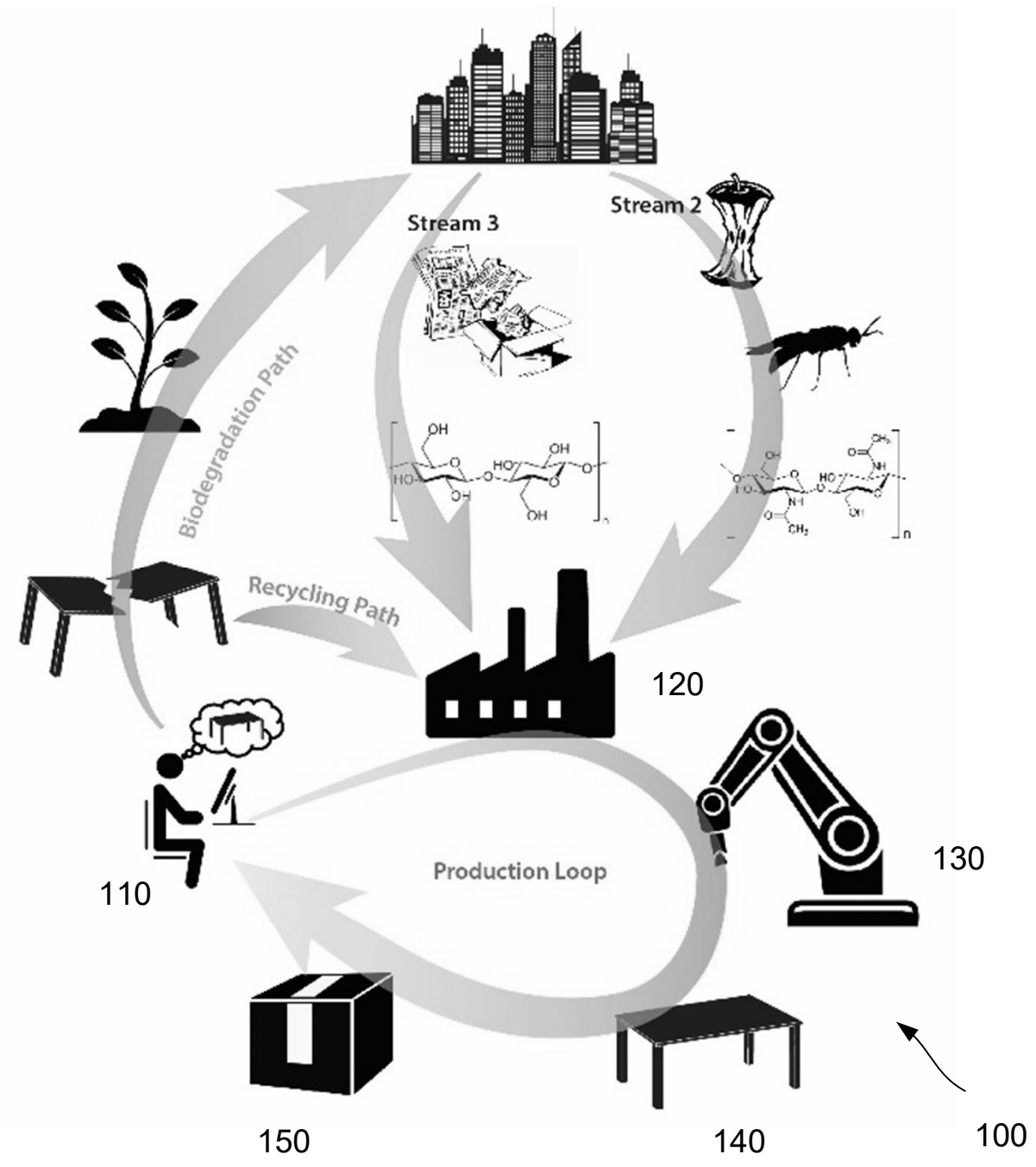

Stream 3
Stream 2
Biodegradation Path
Recycling Path
Production Loop
120
130
110
150
140
100

**FIG 14**

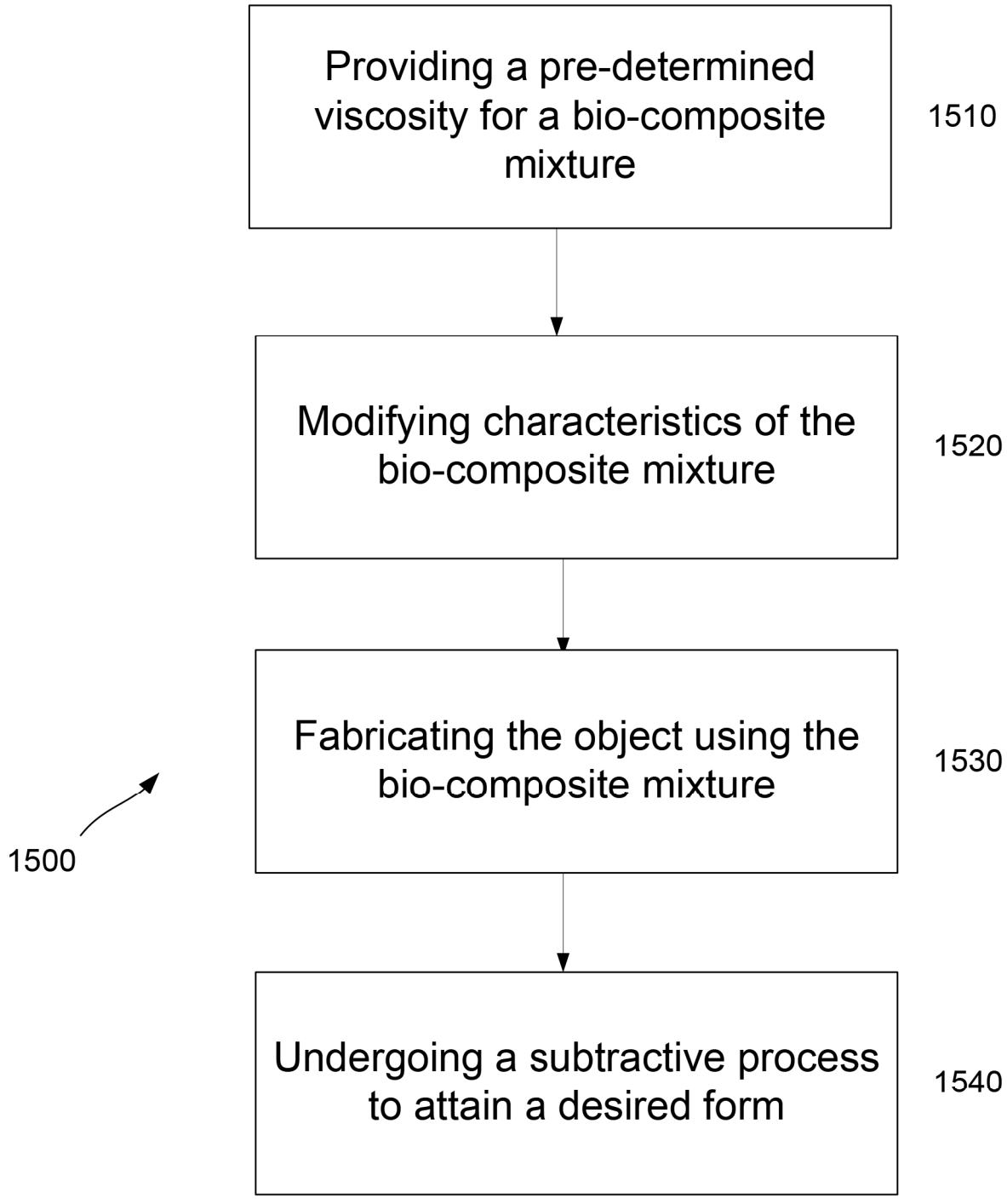

Providing a pre-determined viscosity for a bio-composite mixture
1510
Modifying characteristics of the bio-composite mixture
1520
Fabricating the object using the bio-composite mixture
1530
1500
Undergoing a subtractive process to attain a desired form
1540

**FIG 15**

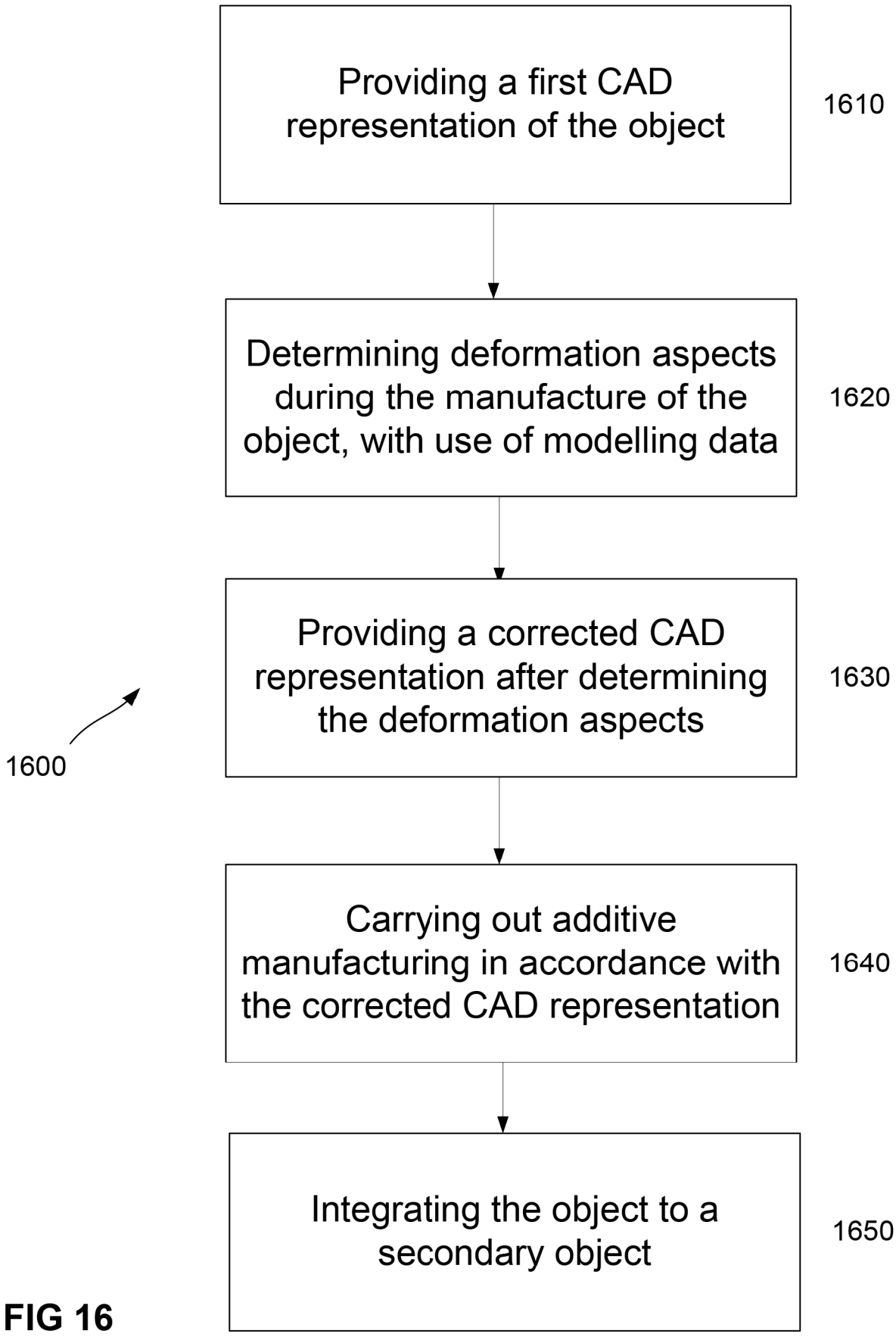

Providing a first CAD representation of the object
1610
Determining deformation aspects during the manufacture of the object, with use of modelling data
1620
Providing a corrected CAD representation after determining the deformation aspects
1630
1600
Carrying out additive manufacturing in accordance with the corrected CAD representation
1640
Integrating the object to a secondary object
1650

FIG 16