Biomimicking
Wood: Biocarbon Template

Pyrolized pine
(biocarbon template)
EW: early wood
LW: late wood
RC: sap channel
P: pit

SiC ceramic made by pyrolyzing pine then Si vapor infiltration


Vogli et al., 2002
Wood: Si-SiC composites

Biocarbon template of beech, pine

Si-SiC composites made by liquid infiltration of Si into the SiC replicas


Zollfrank and Sieber, 2004
Printing honeycomb specimens

Courtesy of Brett Compton and Jennifer Lewis. Used with permission.

Brett Compton, Jennifer Lewis
Honeycomb specimens

4 mm

~50 layers

19 mm

Courtesy of Brett Compton and Jennifer Lewis. Used with permission.

Fiber reinforced walls
Trabecular Bone: Metal Foam


Trabecular bone
Muller

Tantalum foam
Bobyn et al, 1999
Extracellular matrix: Tissue engineering scaffolds

Leaves, skulls: Sandwich panels


Palm: Density Gradients

- Can replicate structure of plant materials with density gradients using same methods as for woods
- Projects at MIT on density gradients in foamed cements, using either gravity or centrifugal force to produce density gradient
Density Gradients: Concrete


Timothy Graham Cooke, MArch Thesis, MIT 2012
Animal Quills, Plant Stems

Cylindrical shells with foam/honeycomb core
Grass

Hedgehog spine

Porcupine quill

Toucan beak


Milkweed stem

Blue jay feather

Gibson Ashby and Harley, 2010

Cylindrical shells with compliant cores

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http://www.amjbot.org/content/93/10/1455.abstract

Milwich et al., 2006
Cylindrical shells with compliant cores
