Projekt med möjlighet till doktorandplats: Cell adhesion, ytbioteknik och bioinformatik

NANOCRYSTALLINE CELLULOSE COATING OF PAPER FOR CELL CULTURE TISSUE GROWTH APPLICATIONS Objectives: 1) Investigate the fluid dynamics of coating the surface of paper with 5, 7, and 10% nanocrystal rods suspended in water, 2) evaluate the coated surface uniformity and interaction with the paper substrate using X-ray microtomography, 3) analyze the effect of the particle orientation distribution function on cell culture applications, 4) Evaluate cell proliferation on the surface.

X-RAY MICROTOMOGRAPHY OF PAPER WITH APPLICATIONS TO BIOLICAL CELL CULTURE AND TISSUE GROWTH Objectives: X-ray microtomography of base paper and coated paper with specific applications to analysis of biological cell adhesion and proliferation To learn more about the specific projects in this area, contact:

There is also a possibility for bioinformatical projects including software development at the Virginia Bioinformatic Institute. Please contact Ulrika (see below) for more information.

Dr. Ulrika Egertsdotter (svenska!)
Adj. Assoc. Prof.
IPST and School of Biology
Georgia Institute of Technology;
500 Tenth Street, N.W.; Atlanta, GA 30332; U.S.A.
ulrika.egertsdotter@ipst.gatech.edu
+1 404 663 6950

Företag/institution: Georgia Institute of Technology
Plats: Atlanta Georgia, USA
Projektstart: Inom kort

Georgia Institute of Technology

Institute of Paper Science and Technology,
School of Mechanical Engineering, and
School of Biology

Two Ph.D. Projects: ($18,600 stipend plus free tuition)

1. **NANOCRYSTALLINE CELLULOSE COATING OF PAPER FOR CELL CULTURE TISSUE GROWTH APPLICATIONS**

2. **X-RAY MICROTOMOGRAPHY OF PAPER WITH APPLICATIONS TO BIOLICAL CELL CULTURE AND TISSUE GROWTH**

Project Background: Alternative materials are needed in medicine and clinical processes to meet specific material requirements for new clinical applications and to improve cost and environmental performance of high volume laboratory products. Native cellulose has recently been shown to provide a suitable substrate for growth of endogenous cells in mammalian experimental systems when researching potential alternative materials for surgical grafts. The compatibility of cellulose with cellular growth enables novel applications for cellulose also in the area of cell culture vessels and support. Additionally, techniques have been developed for generating cellulose nanocrystals that can be deposited into smooth surfaces with a natural cellulose I crystal structure.

Techniques:

BioTransport	Cell culture techniques	Atomic Force Microscopy	X-ray microtomography
- laser Doppler velocimetry (vel.)	- culture endothelial cells	- image cell surfaces	- reconstruct digital 3-D structure
- pulsed Doppler ultrasonic vel.	- monitor proliferation	- describe crystal surface	- coating interaction with surface
-mesh generation based on MRI	- gene expression analysis	- analyze cell membrane viscoelasticity	- density and void distribution
-computational fluid dynamics (CFD)			
- lattice-Bolzmann CFD			

Institutional Background: The current project is a cross disciplinary effort at Georgia Institute of Technology (http://www.gatech.edu/) between Institute of Paper Science and Technology at Georgia Tech (http://www.ipst.gatech.edu/), School of Mechanical Engineering (http://www.me.gatech.edu/) and School of Biology (http://www.biology.gatech.edu/).

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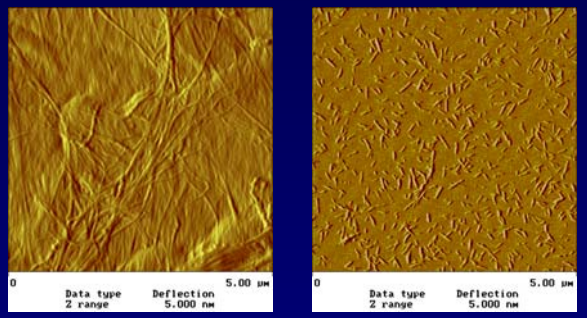
Objectives: 1) Investigate the fluid dynamics of coating the surface of paper with 5, 7, and 10% nanocrystal rods suspended in water, 2) evaluate the coated surface uniformity and interaction with the paper substrate using X-ray microtomography, 3) analyze the effect of the particle orientation distribution function on cell culture applications, 4) Evaluate cell proliferation on the surface.



AFM images of cellulose microfibrils on the surface of paper (left) and the resulting nanocrystals after hydrolysis (right) (by M. Roman)

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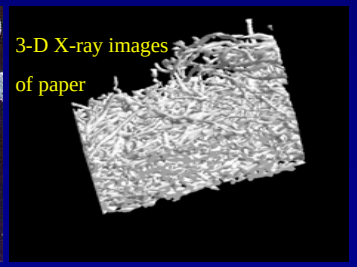
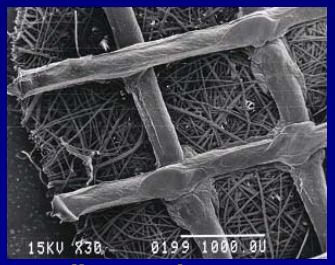
Objectives: X-ray microtomography of base paper and coated paper with specific applications to analysis of biological cell adhesion and proliferation





Cells trapped in non-woven fibrous media

To learn more about the specific projects in this area, contact:

Dr. Cyrus K. Aidun,
Professor,
IPST and School of Mechanical Engineering
cyrus.aidun@me.gatech.edu
+1 404 894 6645

Dr. Ulrika Egertsdotter,
Adj. Assoc. Prof.
IPST and School of Biology
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