

Amy Rachel Betz
Assistant Professor



EDUCATION

B.S. Mechanical Engineering, George Washington University
M.S. Mechanical Engineering, Columbia University
Ph.D. Mechanical Engineering, Columbia University

COURSES TAUGHT at K-STATE

ME 513 Thermodynamics I
ME 523 Thermodynamics II
NE 620 Nuclear Power Systems Lab
ME 699 Undergraduate Research
ME 720 Intermediate Fluid Mechanics
ME 947 Boiling Heat Transfer

RESEARCH



Mitigation and control of frost formation

Patterning surfaces can increase freezing times by a factor of 30 and reduce freezing temperature by 5 K compared to a hydrophilic surface.

Microchannel heat sinks

Due to the small channel size, flow is laminar in microchannel heat sinks. Multiphase flows, including vapor/liquid (shown on right), liquid/liquid, and liquid/solid flows, can promote mixing, as well as increase thermal heat capacity and conductivity; increasing heat transfer performance.

Fouling

The build up of minerals and particulates in heat exchangers can greatly impact performance. Low surfaces energy coatings, surface patterns, and flow control can mitigate fouling in microchannels.

Enhanced boiling heat transfer

Boiling is a multiscale phenomenon, patterning at the micro and nanoscale can enhance both nucleation and liquid transport to drastically increase heat transfer coefficients.

RESEARCH SPONSORS



KANSAS STATE

College of Engineering

Mechanical and Nuclear Engineering

LABORATORY CAPACITY

Surface Modification

Micromilling machine with 1 μm resolution, UV and ozone treatment, thin film fabrication.

Surface Characterization

Confocal microscope with 3-D imaging and mapping capabilities, goniometer, droplet impact and high speed visualization

Experiential Facilities

High pressure boiling vessel, frost growth control stage, vertical plate condensation chamber, multiphase microchannel flow loop.

INDUSTRIAL APPLICATIONS

Food, Energy, Water Nexus

Increasing efficiency of power and refrigeration systems to reduce capital cost, condenser and boiler size, water usage and global warming potential.

Electronics Cooling

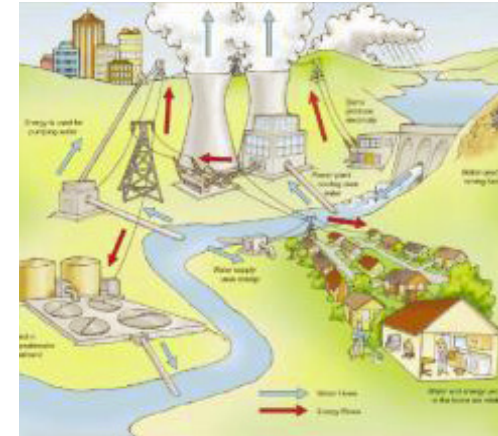
Increasing power density and overall system efficiency to reduce energy consumption.

Aircraft Safety and Reliability

Airports in the US spend over \$500 million per year on de-icing.

Refrigeration and Heat Pumps

Preventing freezing significantly increases the efficiency and operation of heat pumps.



OUTREACH

Kansas Children's Discovery Center

Dr. Betz has participated in events such as *Introduce a Girl to Engineering* and *NanoDays*.

Engineering Education Experience, E3

Dr. Betz is active in E3, a program at Kansas State University that introduces engineering to high school science and mathematics teachers.

