**Thermal shock reduction in materials using surface modification**

**Abstract:**

Temperature gradient in a material causes uneven expansion or contraction of material. This gives rise to thermal shock and as a result the material fails. We can reduce the effect of thermal shock by making the material thermal shock resistance. This can be done in two ways. One way to improve the mechanical properties of the material like increasing thermal conductivity, reducing coefficient of thermal expansion, changing the structure of the material, adding additives etc. The other way is to change the mode of heat transfer. This method is very effective and can be used on different type of materials. Maximum heat flux occurs during nucleate boiling and lowest heat flux occurs during film boiling beyond the Leidenfrost point. By promoting the film boiling mode of heat transfer, the material will experience least thermal shock. It is well known that increase in hydrophobicity reduces Leidenfrost point thereby promoting heat transfer. We are investigating the reduction of thermal shock in materials by droplet impingement on heated surfaces. We compare the thermal shock experienced by the same material but with different surface characteristics. The temperature range is 125°C to 350°C. The properties of the impinging droplets like Weber number, diameter, impact velocity on heated surface is analyzed by high speed camera and the properties of the surface by SEM, contact angle measurement.

**Bio:**

Divya Jyoti Prakash completed his undergraduate education in Chemical Engineering at National Institute of Technology(N.I.T.) Rourkela, India. He worked in the software industry for 6 years before joining University of New Mexico as graduate student in Spring 2015. Completed Master of Science Degree in Nanoscience and Microsystems in 2017. His Master thesis was on Ion Size Effects on the Properties of Charge Regulating Electric Double Layers. This work is based on the hypothesis that solvent and ion size effects have significant effect on the electric double layer(EDL) properties and electrical double layer capacitance. This challenges the 100 years old theory that solvent size does not play a role in the formation of EDL. He started his PhD in Chemical Engineering at University of New Mexico in 2017. The current research focus is to develop surfaces that promote film boiling to reduce thermal shock in materials under the guidance of Dr. Youho Lee.