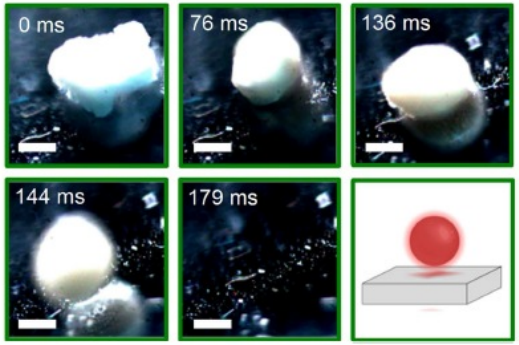
Controlling Biomass Leidenfrost Liftoff and Heat Transfer

Scientific Achievement

Discovered the 'reactive Leidenfrost' effect in cellulose & transition temperature (750 °C). Structured materials with engineered macropores (e.g. catalysts) allow for its tunable control.

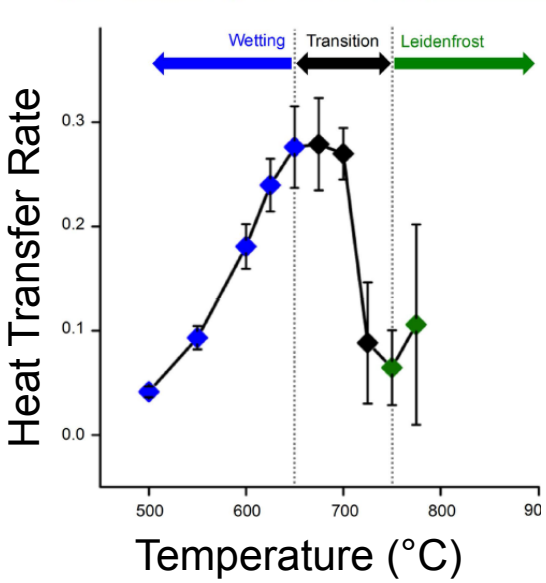


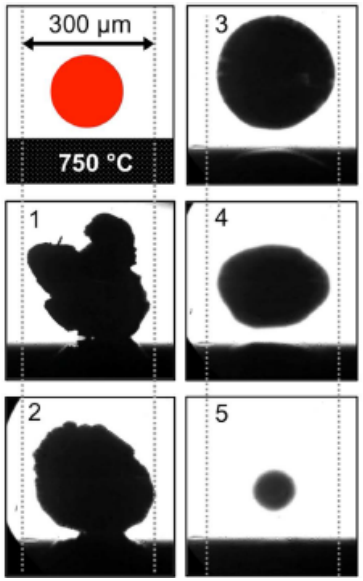
Significance and Impact

- **Heat transfer to lignocellulosic biomass is enhanced by particle/surface contact. This in turn is controlled by the microstructure of the surface by directing gas/vapor flow.**

Research Details

- Cellulose particles levitate above 750 °C from generated vapor flow
- Onset of particle levitation dramatically lowers heat transfer to cellulose particles (~10X)
- Heat transfer on a macroporous surface (color photo) suppresses particle levitation and provides a means to control heat transfer.





Teixeira *et al.* **Nature Scientific Reports 2015**, 5, 11238,
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Work was performed at the University of Minnesota by the group of Dauenhauer