

High throughput tribometer for friction, wear, and adhesion measurements

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The relationship between various tribological properties such as friction and adhesion has been a topic of research interest in the field of surface science for decades. Although, many theoretical and experimental studies have probed this relationship, a few important experimental challenges remain including: 1) lack of a single platform that can measure all tribological properties and minimize instrument-to-instrument variation, and 2) lack of flexibility of using different probe types that limits the number of interfaces that can be investigated. Here, the authors present an automated high throughput tribometer that is specifically designed and fabricated to measure static friction, kinetic friction, wear/lubrication, and adhesion properties on a single platform. The novel instrument design also allows for various probe types in order to explore a variety of coatings, thin films, lubricants, and bulk surfaces. Various design parameters will be discussed including adhesion probe head, friction/wear probe head, and linear actuator for friction trace and retrace cycles.

The talk will also cover examples of data collection and analysis specifically designed to explore correlation between surface properties and handle large amounts of high throughput data. The novel experimental scheme allows for accurate measurement of lateral forces at the onset of sliding giving reliable static friction data. Additional capabilities include evaluation of kinetic friction as a function of normal load and probe velocity, characterization of surface wear as a function of normal load, number of cycles, and probe velocity, and measurement of adhesion force and energy as a function of normal load and pull-off velocity.

Biography

Vivek Kalihari completed his PhD in Materials Science from University of Minnesota in 2010 and his BS in Metallurgical Engineering and Materials Science from Indian Institute of Technology Mumbai in 2005. He is a Senior Research Engineer in the Dow Chemical Company, Midland MI and his research mainly focuses on novel coatings, new packaging solutions, and high throughput research. He has authored/co-authored more than 10 research articles in high impact factor journals and given multiple presentations in reputed international conferences.

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