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# Advanced Sliding Contact Interactions in Micro/Nanoscale Systems


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## ABSTRACT:


With current demand for decreased size of micro/nanoscale systems, critical understanding of the ensuing impact and sliding contact related behavior of thin films used in these systems is of critical importance for improved design and reliability. In modern micro/nanoscale technologies significant emphasis is placed on the design of thin-films, which can provide the required contact and scratch resistance. To aid this endeavor, scientific studies of the contact and scratch processes in these systems, both static and dynamic are needed to provide the tools necessary to help the advancement of these technologies. One such problem is the sliding contact and sub-nanometer wear of the slider and disk in magnetic storage hard disk drives in the quest for ultra high recording densities, beyond 1 Terabit per square inch. Similar contact problems are encountered during the operation of other micromechanical systems like radio frequency microelectromechanical switches, where surface damage is observed after cyclic contact. In this seminar, we first present a specialized nanoindentation technique to directly measure the nanomechanical properties of nanometer thin-films on multilayer systems. Once the properties of the multilayer system are known, sliding contact on multilayer thin films specific to magnetic storage hard disk drives is presented. Such results shed light to the reliability and wear of contacting, sliding and impacting micro/nanoscale systems, where contact features are only few microns thick and thin film layers are as thin as few nanometers.


## BIOGRAPHY:

Dr. Polycarpou received his Ph.D. from the University at Buffalo in 1994. Before joining Texas A&M in 2012, he was the Wilkins Professor and Associate Department Head at the University of Illinois Urbana-Champaign. He was also the Founding Department Chair of Khalifa University (Abu Dhabi) from 2011-212, while on leave from the University of Illinois. Before that, he was a post-doctoral fellow at the Technion and a staff scientist at Seagate Technology. Dr. Polycarpou's research interests include tribology, micro/nano tribology, nano mechanics, and advanced interface materials. Emphasis has been on micro/nanoscale contact problems with application to micro-devices, as well as the tribology of devices for reduced energy and improved environmental-related impact. Polycarpou is the author of 200 archival journal papers, numerous book chapters, volume proceedings, and a dozen patents. Polycarpou won numerous national and international awards, including the ASME Burt L. Newkirk Award, the National Science Foundation Faculty CAREER Award, the Xerox Award for Faculty Research, the STLE Edmond E. Bisson Award, a Fulbright Scholar, the ASME K.L. Johnson Best Paper Award and the STLE Walter D. Hodson Award. Polycarpou is active in the tribology and mechanics communities, where he served in many posts, including Chairing the ASME Tribology Division. He was also an Associate Editor for the ASME Journal of Tribology, serves on several Editorial Boards, has organized numerous conferences including being the Chair of the 2009 International Joint Tribology Conference. Dr. Polycarpou is currently serving on several honors and awards committees, and is the Chair of the Executive committee of ASME's Department Heads Council.