Real-time observation of tribological behavior of coatings

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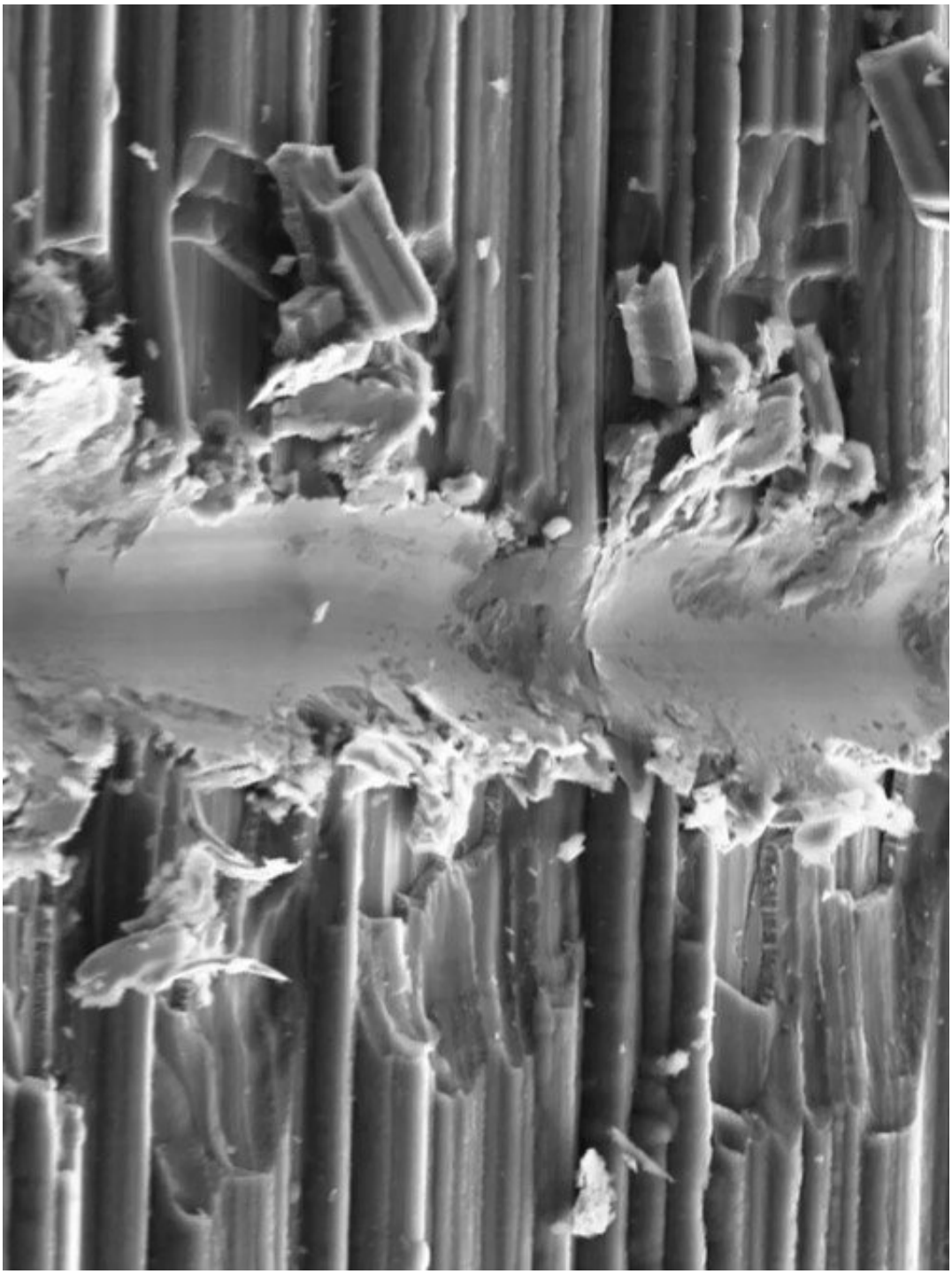

Credit: National Physical Laboratory

Surface engineering and advanced coatings can provide tremendous

benefits in terms of improved performance and efficiency savings. It is therefore important that coatings and surface treatments are optimized to achieve the best results.

New research published in *Surface and Coatings Technology* focuses on the way that real time in situ measurement techniques can be used to observe the tribological behavior of coatings and reveal the mechanisms that occur enabling the correlations of these mechanisms to the microstructure of the materials that are being tested. The understanding that is gained by these experiments can then be used to improve the design of the coatings and surface treatments by the surface engineering industry.

The performance and efficiency savings that result will help to enable take up of these new technologies by diverse industrial sectors including road and air transport, power generation, and manufacturing, driving clean growth and sustainable use of materials.

The research also examined the application of the world leading NPL test systems. These enable real time observation of the mechanisms of damage in tribological contacts, where the highlight was the high-resolution in situ observations in the SEM, of the fracture and delamination of a DLC coating from the substrate when subjected to damage from a sharp asperity.

The next step in the development of the research will be to improve the reliability of the test system and introduce artificial intelligence into the control system, to achieve a digitally enabled metrology for engineered surfaces.

Mark Gee, NPL Fellow said "It is a real breakthrough to be able to visualize what actually takes place in a tribological contact as it happens. Before now only limited information could be obtained through a

laborious and time-consuming series of experiments."

More information: Mark Gee et al, In situ real time observation of tribological behaviour of coatings, *Surface and Coatings Technology* (2022). DOI: 10.1016/j.surfcoat.2022.128233

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