patterns. There are no copper peaks visible, but we cannot exclude the presence of a small amount. That is the reason for our planned synchrotron experiments—the high energy resolution will allow us to distinguish Cu^0, Cu^+, and Cu^{2+} easily."

The electrochemically treated materials show significant photocurrent starting at -0.49 V during scans toward more negative potentials and up to -0.32 V in the backwards scans. The photocurrent is smaller than that of KCN-etched samples. "This might be due to the presence of a thin $Cu_{2-\delta}S$ layer or residual copper," said Störkel. "We are currently working on the transformation of Cu_2S into stoichiometric $CuInS_2$ using, for example, alkaline solutions containing In^{3+} ions."

CORA LIND

Third-Body Interfacial Layers Reduce Wear of Dental Glass-Ceramic Surfaces

An understanding of the mechanisms of wear between restorative dental glass-ceramic interfaces is important in the development of new, wear-resistant dental materials. Ideally, experiments should simulate the conditions inside the mouth during chewing, where debris layers formed between the teeth are flushed away by saliva and the sliding motion of the contacting surfaces, preventing the formation of a stable, third-body interface. Researchers Attota Ravikiran and Said Jahanmir of the Ceramics Division of the National Institute of Standards and Technology (NIST) compared the wear of surfaces that were continually flushed with fresh distilled water with those whose surfaces were not flushed during controlled grinding to elucidate the nature and importance of the third-body interface. Their results are reported in the July issue of the *Journal of the American Ceramic Society*.

Blocks of Dicor MGC (from Dentsply), a tetrasilicic fluoromica compound containing mica platelets with an average diameter of 2 μm, were polished to an average surface roughness of 5.6 ± 1.2 nm using diamond pastes. High-purity (99.5%) alumina balls with a Vickers hardness of 14.7 GPa were fashioned into a pin-on-disk type of tribometer. The alumina balls were ground against the polished faces of the Dicor MGC at loads varying from 5 to 30 N along wear-track diameters of 6.5 and 9.5 mm, with the contact surface submerged in distilled water at all times. In one set of tests (the "flushing" experiments), the contact surface was continuously flushed with fresh distilled water during the entire sliding period; in the "nonflushing" experiments, the original water was retained throughout the experiment, so that the surfaces were not cleaned of debris.

Subsequent measurement of wear volumes revealed that the flushed surfaces wore more heavily than the nonflushed surfaces. This result indicates that accumulation of third-body wear debris at the interface of dental ceramics acts as a protective, load-carrying film that separates the primary contact surfaces and thus reduces wear. In the absence of such an accumulation—when the interface is flushed—the dental ceramic itself is subject to greater degrees of deformation and fracture. The researchers suggest that experiments utilizing a flushing technique simulate actual oral conditions more closely, and might give more meaningful data in future investigations.

TIM PALUCKA

Sputtered Co/Ti Film Directly Oxidized Forms High-κ $CoTiO_3$

A high-quality, ultrathin, high-κ cobalt-titanium oxide ($CoTiO_3$) dielectric was recently reported in the September issue

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