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**Study of Scratching Resistance Mechanism of Ultra-thin Diamond-Like-Carbon (DLC) Coatings Deposited on Glass** WEIDIAN SHEN, RENE CROMBEZ, JEREMY MCMINIS, V. S. VEERASAMY, DEPARTMENT OF PHYSICS AND ASTRONOMY, EASTERN MICHIGAN UNIVERSITY, YPSILANTI, MI 48197 COLLABORATION, SCIENCE AND TECHNOLOGY, GUARDIAN INDUSTRIES CORP., CARLETON, MI 48117 COLLABORATION — Depositing an ultra-thin diamond-like-carbon (DLC) coating of 4.5 nm thick on the surface of soda-lime glass, using the linear ion beam deposition technique, significantly improved the scratch resistance of the glass. To understand the mechanism, a nano-indenter with a conical-shaped diamond tip was used to carry out the scratch tests on the coated and uncoated glasses, and a scanning probe microscope was used to examine the damage morphologies along the scratches. The same indenter with a Berkovich diamond tip was also used to carry out the indentation tests, measuring the elastic modulus and hardness of the coated and uncoated glasses. It was found that while the coating increased the elastic modulus and hardness a little, the critical contributor of the improved scratch resistance is the compressive stress residing in the coating and the top layer of the glass, which was yielded during the deposition process. It counters the tensile stress of scratching and suppresses the cracking, thus the coated glass possesses a significantly better scratch resistance.

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