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Research Applications of Photoelectron Emission Microscopy WAYNE HESS, GANG XIONG, ALAN JOLY, KENNETH BECK, Pacific Northwest National Laboratory, WEI WEI, J. MIKE WHITE, Department of Cheistry, University of Texas, MINGDONG CAI, J. THOMAS DICKINSON, Department of Physics, Washington State University — Photoelectron emission microscopy (PEEM) is a developing technique that images electrons emitted from conductor and semiconductor surfaces under UV, X-ray, or laser irradiation. Low energy PEEM can reveal surface morphology on a 10 nm scale and is sensitive material properties such as phase, adsorbed molecules, surface electronic structure, and other physical properties that affect work function and hence the photoelectron yield. We have used PEEM to study phase transformation in shape memory alloys diffusion of Cu in Cu/Ru bilayers and laser-induced oxygen vacancy creation on TiO_2. Femtosecond laser irradiation from a frequency-doubled Ti:sapphire oscillator was used to remove bridge-bonded oxygen atoms. To further illustrate the utility of PEEM, we will discuss applications in different fields such as thermal-induced structural phase transformation of shape memory alloys and diffusion of Cu through an Ru barrier layer.

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