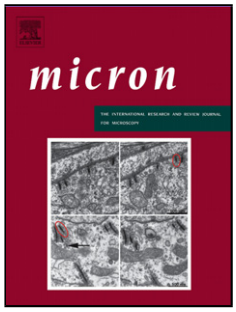

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Damage behaviour and atomic migration in $MgAl_2O_4$ under an 80 keV scanning focused probe in a STEM

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Abstract:

With the dramatic improvement in the spatial resolution of scanning transmission electron microscopes over the past few decades, the tolerance of a specimen to the high-energy electron beam becomes the limiting factor for the quality of images and spectra obtained. Therefore, a deep understanding of the beam irradiation processes is crucial to extend the applications of the electron microscopy. In this paper, we report the structural evolution of a selected oxide, $MgAl_2O_4$, under an 80 keV focused electron probe so that the beam irradiation process is not dominated by the knock-on mechanism. The formation of peroxyl bonds and the assisted atomic migration was studied using imaging and electron energy-loss spectroscopic techniques.

Introduction:

The developments in scanning transmission electron microscopy (STEM) have enhanced the capability of imaging individual atoms on a surface (Crewe et al., 1970), atoms within a solid bulk (Voyles et al., 2002) and have made it possible to even probe the bonding