

Evolution of the $\text{Bi}_2\text{Mo}_3\text{O}_{12}$ (010) Surface Following Reactions in H_2

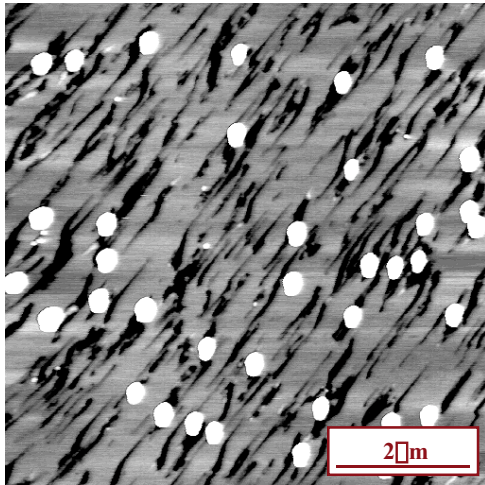


Figure 1: 7 minutes in 10% H_2/N_2 at 450°C

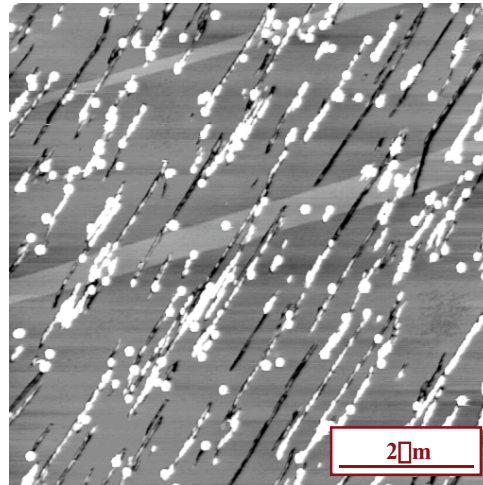


Figure 2: 15 minutes in 10% H_2/N_2 at 450°C

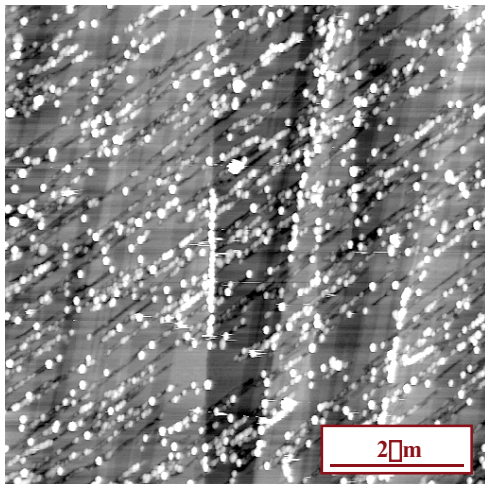


Figure 3: 30 minutes in 10% H_2/N_2 at 450°C

Atomic Force Microscopy (AFM) was used to study the surface changes that occur during reactions in hydrogen to the selective oxidation catalyst, $\text{Bi}_2\text{Mo}_3\text{O}_{12}$. Figure 1 is an AFM micrograph of a freshly cleaved crystal that was reacted at 450°C in 10% $\text{H}_2/90\%\text{N}_2$ for 7 minutes. The micrograph shows pit and precipitate formation. Figure 2 shows a crystal reacted under the same conditions for 15 minutes. The pits have straightened out and are oriented along the [001] direction. The precipitates now seem to preferentially form along the pit walls. Figure 3 shows a crystal reacted for 30 minutes and shows that the concentration of pits and precipitates has increased. Pit formation is believed to occur as a result of MoO_3 volatilizing out of the crystal. X-ray diffraction shows that the precipitates are Bi_2MoO_6 .

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