# Surface Evolution of $Bi_2Mo_3O_{12}$ Surface During Annealing

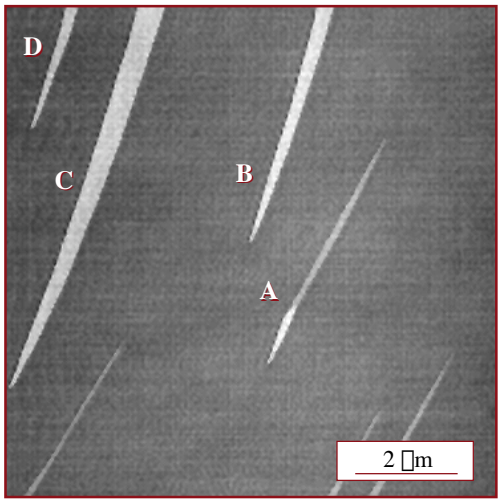


Fig. 1: Freshly cleaved surface.

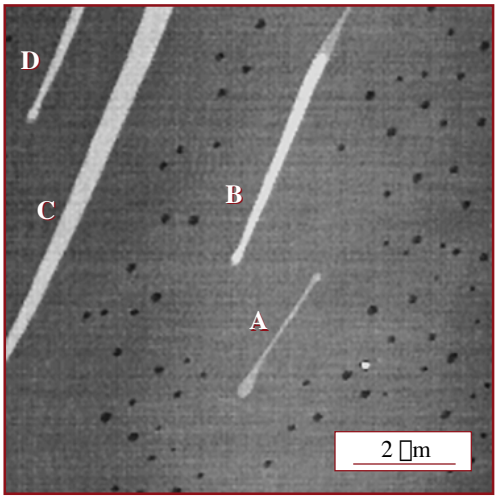


Fig. 2: same surface after anneal in air at 450°C for 1hr.

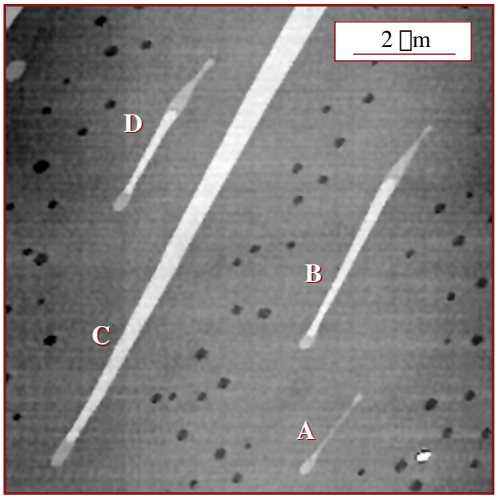


Fig. 3: same surface after anneal in air at 450°C for 2hr.

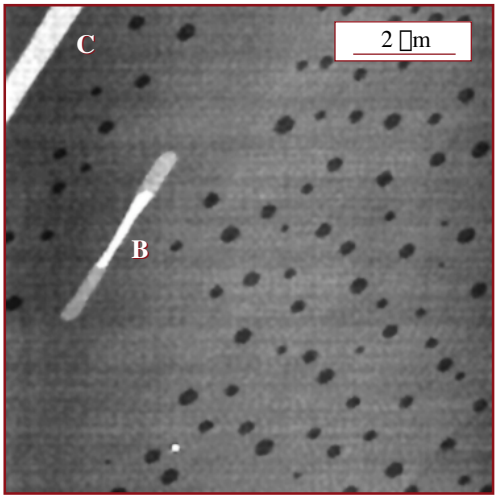


Fig. 4: same surface after anneal in air at 450°C for 5hr.

An Atomic Force Microscopy (AFM) study of □-$Bi_2Mo_3O_{12}$ was performed to determine how the surface of this oxidation catalyst evolves during annealing. Figure 1 is an AFM micrograph of the (010) surface of a freshly cleaved $Bi_2Mo_3O_{12}$ single crystal. The features are marked so that their evolution can be easily followed in Figures 2-4. The heights of these islands are equal to 1/2b or 1b, where b = 11.6Å and is length of the b-axis. Figure 2 shows the same area after the crystal was heated in air at 450°C for 1 hour. This image shows the formation of pits (depth = 1/2b) and a reduction in volume of the islands. Figure 3 is the same area after an additional hour. There was no change in the pits from Fig. 2 but, the volume of the islands has been further reduced. Figure 4 shows the same area following 3 more hours. The island marked "A" has completely disappeared and the pits have coarsened. The shape evolution of this surface is being driven both by the minimization of the total surface area of the islands and by the volitalization of the surface.

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