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Faceting of Re ($11\bar{2}1$) induced by oxygen HAO WANG, WENHUA CHEN, THEODORE E. MADEY, Department of Physics and Astronomy and Laboratory for Surface Modification, Rutgers University, Piscataway, NJ 08854 — The oxygen-induced nanoscale faceting of Re ($11\bar{2}1$) has been studied by low energy electron diffraction (LEED) and Auger electron spectroscopy (AES); the results are compared with recent STM and LEED studies of O-induced faceting of Re($12\bar{3}1$). The evolution of surface morphology depends on oxygen exposures and deposition temperatures. Re($11\bar{2}1$) remains planar after oxygen deposition at 300K. Annealing O-covered Re($11\bar{2}1$) between 800K-1200K leads to the formation of ($01\bar{1}0$) and ($10\bar{1}0$) facets that coexist with the ($11\bar{2}1$) surface. Under oxidation conditions, i.e. dosing a large amount of oxygen at high temperatures (900-1000K), the ($11\bar{2}1$) surface is completely covered by 4-sided nanoscale pyramidal structures whose facets are identified as ($01\bar{1}0$), ($10\bar{1}0$), ($01\bar{1}1$) and ($10\bar{1}1$). The fact that the ($11\bar{2}1$) surface becomes completely faceted only after oxidation is consistent with our previous data for O-induced faceting of Re($12\bar{3}1$), where one facet has the ($11\bar{2}1$) orientation and is unstable against oxidation. The faceted O/Re surfaces may be potential templates to grow nano-structures with narrow size distribution, and may also be substrates to study structural sensitivity in catalytic reactions.

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