

Helium Ion Microscope (HIM) assisted atomic re-design makes brittle aluminium oxide plastic

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The Helium Ion Microscope is a fascinating young technology. Its unique capabilities, including sub 10nm structuring, imaging non-conductive samples and its ability structure semiconductors while avoiding the gallium poisoning make it a versatile tool in materials research and design.

This study shows how the Helium Ion Microscope (HIM) can be used to rearrange a nanoporous anodized alumina material on the atomic scale and to shrink its pores well below the sizes it is possible to produce by common electrochemical anodization method. The originally brittle and porous ceramic turned superplastic and gained the ability to stretch more than twice without breaking. The presentation focuses on the underlying ion solid interactions with the aluminium oxide sample and aims to explain why the material re-design occurs when irradiating the sample with helium ions.

The Helium Ion Microscope can do more than imaging and nanostructuring samples. It can also atomically re-design materials which display vastly different behaviour than their original phase. You are only limited by your imagination in materials design.

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