

Engineers give industry a moth's eye view

November 26 2007

When moths fly at night, their eyes need to capture all the light available. To do this, certain species have evolved nanoscopic structures on the surface of their eyes which allow almost no light to reflect off the surface and hence to escape.

Now scientists at MicroBridge, a project at Cardiff University's Manufacturing Engineering Centre (MEC), have adopted the model to create an industrial lens for use in a low light environment.

The structures on the surface of the new lens are less than 100 nanometres in height. They need to be smaller than the wavelength of light to avoid disrupting the light as it enters the lens.

The tiny features of the lens mould were created using the MEC's Focused Ion Beam. The beam uses highly charged atomic particles to machine materials in microscopic detail.

Dr Robert Hoyle of the MEC said: "This was a particularly complicated challenge. Not only did the lenses have to be of very precise curvature but the nanoscopic structures on the lens surfaces had to be smaller than the wavelength of light so as to smooth out the sharp refractive index change as the light strikes the surface of the lens. This smoothing of the refractive index reduces the reflectiveness of the lens thus allowing it to capture more light. The end result has a number of highly practical uses for industry."

The research team is now looking at using the lens in optoelectronics and

photovoltaic applications in semiconductors, including solar cells, where loss of light is a major problem. The lens also has potential uses in fibre optics, sensors and medical diagnostic devices.

Source: Cardiff University

Citation: Engineers give industry a moth's eye view (2007, November 26) retrieved 10 April 2024 from <https://phys.org/news/2007-11-industry-moth-eye-view.html>

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