Institute of Physics



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# Pyramids give batteries a longer life

A way of increasing battery life in devices such as laptop computers, personal TVs and camcorders is reported today in the Institute of Physics Journal, *Journal of Micromechanics and Microengineering*. Researchers at the University of Michigan and the National Taiwan University, have developed a film which increases the display brightness by 100 percent or more when placed over the screens, hence saving energy.

Using a new technology, similar to that used by Intel Inc. in the fabrication of the Pentium III chip, Liwei Lin and his colleagues have significantly improved conventional processes to make the brightness enhancement films.

Films to improve the brightness of liquid crystal displays consist of microstructures (structures the size of a fraction of a millimetre) built on top of transparent plastic films. They conserve energy by redirecting and redistributing light so that its direction is 'concentrated'. These films have been used in consumer electronics devices since the early 1980s. Conventional methods of making the films, use mechanical technologies, which make it difficult to achieve microstructures with very smooth surfaces. As a result light rays can be reflected and refracted unpredictably, resulting in energy losses.

The new technique produces 'micropyramids' by combining micro-machining and plastic molding technologies, making it easy and inexpensive to mass-produce the new films. The advantage of micro-machining is its ability to build fine mold inserts, making 'micropyramids' with very smooth surfaces. The pyramid structures are designed to prevent energy losses by allowing the majority of light rays from a restricted range of directions to pass through, thereby concentrating the output. Because of the increased smoothness of the surfaces of the pyramids the brightness is enhanced without additional power, and energy loss is minimal. In this way an increase in brightness of 100 percent or more can be achieved without any extra input energy being required.

***Notes for editors***

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2. *Journal of Micromechanics and Microengineering* is an international journal published by Institute of Physics Publishing, a wholly owned subsidiary of the Institute of Physics. For further information on this and other Institute journals please contact: Ian Russell, Managing Editor, *Journal of Micromechanics and Microengineering,* email: ian.russell@ioppublishing.co.uk, http://www.iop.org/EJ/journal/0960-1317

3. For further information about the physics behind the work, please contact: Liwei Lin, Department of Mechanical Engineering, University of California, Berkley, Tel: +1 (510) 643 5495, Fax: +1 (510) 643 5599, email: lwlin@me.berkeley.edu

4. The Institute of Physics is a leading international professional body and learned society, established to promote the advancement and dissemination of a knowledge of and education in the science of physics, pure and applied. The Institute has a world-wide membership of over 29,000 and is a major international player in:

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