Researcher working on micro-electromechanical systems to replace pixels

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(PhysOrg.com) -- Wallen Mphepö of National Chiao Tung University in Hsinchu, Taiwan, appears to believe the future of computer displays lies in micro-electromechanical systems (MEMs), rather than the pixel technology now dominating computer, phone and other device screens. Current technology requires three sub-pixels for every pixel or dot displayed, a system that Mphepö believes uses too much energy and is hard on the eyes.

In a recent chat with The Economist he reveals a bit of what he and his team think is a better way.

Instead of three sub-pixels, each capable of displaying a different color, Mphepö and his team are working on a way to display data using just one tiny mechanical device for each dot, each of which can be controlled individually to change its angle to diffract light, thus producing the desired color. The way it works is each dot is made from a single piece of zirconium dioxide, just 30 microns across. It's coated on one side with a very thin layer (1.23 microns) of silver to create a very tiny mirror that can be controlled electrostatically via a small electrical charge; the same kind used to run LCDs not coincidently. The result is a very tiny mirror that can be precisely controlled to reflect incident light to the degree desired.

Interestingly, because the zirconium has a much higher refractive index, it's the material that allows for the reflecting, not the silver, which is so thin that light actually passes through it, though technically, it's the point

where the two materials meet that is doing the actual reflecting. Also interesting is the fact that the length of the mirror is exactly twice that of the wavelength of visible light; this because it allows for a process that takes advantage of light rays being amplified or canceled.

The system works because it allows for changing the path length of rays of light which hit the mirror and bounce back to the viewer, via tilting; which, because of the way the rays land on one another, result in amplification of some colors while others are canceled out.
This is not the first time Mphepö has made news with his unconventional ways of doing things. Just last year, he published a paper describing a way to create a prism-patterned 3D screen. So far he isn't giving away how far he and his team have come in developing this new micro-electromechanical system or whether they are close to offering a demo, but if his new way of making screens comes to fruition it could mean either much higher resolution screens or drastically cheaper ones, depending on which way manufactures choose to go with it. It would also mean screens that could be read indoors or out, similar to those using e-Ink technology, such as the Kindle.

More information: Wallen Mphepö's previous research was covered in the PhysOrg.com feature: Prism-patterned screen brings paradigm shift to 3D displays