LSST students discuss nanotechnology with University of Cambridge professors
http://www.lsst.ac/wp-content/uploads/71524929_cambridge1.mp4
The world-renowned Cambridge University NanoPhotonics Centre was set up in 2007 to explore how new materials can be created, in which the interaction between light and matter is altered to produce useful new effects.
Students from LSST London, Luton and Birmingham campuses were given a bespoke opportunity to discuss the methodology behind designing the smallest pixels yet created – a million times smaller than those in smartphones – with Professor Jeremy Baumberg, Head of Group, and Dr Hyeon-Ho Jeong, Research Associate, at the Cambridge University NanoPhotonics Centre.
LSST student interviewers: Renata Carvalho, SU President; Angel Terjek, Y2 Business Foundation (LSST London); Humeera Bashir, Y2, Public Health and Social Care student (LSST London); Lucian Catalin Birarutu; Y1 Business Management (LSST Luton) and Aleha Begum, Y2 Business Management (LSST Birmingham).
1. What was the inspiration behind the research?
It has been a long-held dream to mimic the colour-changing skin of octopus or squid, allowing people or objects to disappear into the natural background, but making large-area flexible display screens is still prohibitively expensive because they are currently constructed from highly precise multiple layers.
2. How have the smallest pixels yet created – been created?
At the centre of the pixels is a tiny particle of gold a few billionths of a metre across. The grain sits on top of a reflective surface, trapping light in the gap in between. Surrounding each grain is a thin sticky coating which changes chemically when electrically switched, causing the pixel to change colour across the spectrum.
3. Were there any major challenges faced during the research and, if so, how were these overcome?
The major challenge lies in material engineering, especially the solution chemical process. The strong support from the research team from NanoPhotonics Centre and other collaborating groups across the University helped us to take forward the project.
4. How can the pixels enable a host of new application possibilities?
The pixels can be seen in bright sunlight and because they do not need constant power to keep their set colour, have an energy performance that make large areas feasible and sustainable. They could enable a host of new application possibilities such as building-sized display screens, architecture which can switch off solar heat load, active camouflage clothing and coatings, as well as tiny indicators for coming internet-of-things devices.
5. How durable are the pixels compared with current display technology found in mobile phones?
Our current test result is up to 3 months, which is shorter compared to commercial mobile phone pixels. But we haven’t optimised the device to the best. We believe they could last as long as years if proper device design and material engineering are made.
6. Wouldn’t the pressure inside the aerosol spray impact the integrity of the

gold particles?
As far as we know, the polymer-coated gold particles are quite stable during aerosol spray.
7. What impact do the pixels have in regard to light pollution?
The displays made by these pixels are the reflective type. They use ambient light like sunlight during the daytime to generate colours, so they will not lead to extra light pollution.
8. Can you elaborate on the application of plasmonic nanoparticles in the effective treatment of cancer?
Plasmonic nanoparticles can be heated remotely by light to damage/destroy cancerous cells and tissues.
9. Who do you partner with – and are you seeking new partners?
We are now looking for partners to develop the technology further.
10. Can this system of flexible display with multiple layers be adjusted and used for more advanced and complex surfaces? Perhaps we will see military personnel wearing 'invisible cloaks' in future?
This system can be utilised to any 3D surface if the surface can be coated with plasmonic metal to function as a mirror. 'Invisible cloaks' is possible but need more efforts.
11. What should the realm of NanoPhotonics explore next?
NanoPhotonics explores how new materials can be created, in which the interaction between light and matter is fundamentally altered to produce fascinating and useful new effects. We are interested in exploring both new sciences in nanoscale and novel applications to make nanoscience into real life.
Find out more about the amazing work of the NanoPhotonics centre here: https://www.np.phy.cam.ac.uk/
Please email at kunal.mehta@lsst.ac for any questions or comments on this article and to find out more about participating in similar events and interviews.
LSST students, join the debate and comment below: What are your views on the astonishing research undertaken by the NanoPhotonics Centre?