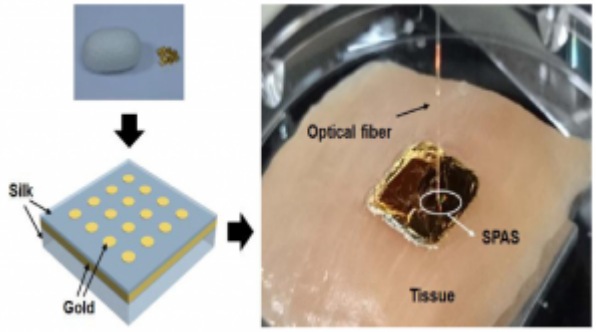
# A Highly Tunable and Fully Biocompatible Silk Nanoplasmonic Optical Sensor

Myungjae Lee et al., report a Highly Tunable and Fully Biocompatible Silk  Nanoplasmonic Optical Sensor. Novel concepts for manipulating plasmonic resonances and the biocompatibility of plasmonic devices offer great potential in versatile applications involving real-time and in vivo monitoring of analytes with high sensitivity in biomedical and biological research.




They report a biocompatible and highly tunable plasmonic bio/chemical sensor consisting of a natural silk protein and a gold nanostructure. Their silk plasmonic absorber sensor (SPAS) takes advantage of the strong local field enhancement in the metal–insulator–metal resonator in which silk protein is used as an insulating spacer and substrate. The silk insulating spacer has hydrogel properties and therefore exhibits a controllable swelling when exposed to water–alcohol mixtures. They experimentally and numerically show that drastic spectral shifts in reflectance minima arise from the changing physical volume and refractive index of the silk spacer during swelling. Furthermore, they apply this SPAS device as a glucose sensor with a very high sensitivity of 1200 nm/RIU (refractive index units) and high relative

intensity change.

For more information please visit:

http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.5b00680

Source: M Lee, H Jeon, S Kim – Nano letters, 2015 – ACS Publications, **DOI:** 10.1021/acs.nanolett.5b00680

Publication Date (Web): March 30, 2015

---

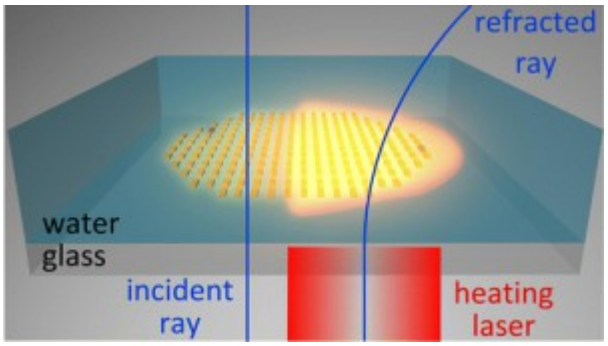
# An adaptive plasmonic lens

**" Nature highlights a recent ACS Photonics study on a novel reconfigurable lens"**

In constant search for miniaturizing commercial optical devices, integrated micro-optical elements play a central role in the development of applications that aim to improve high-density data storage and imaging. Until now, such devices presented the drawback of fine aligning and adjusting the focus through mechanically operations, therefore, limiting their accuracy, size and speed.

Now, in the recent study "Fast and Transparent Adaptive Lens Based on Plasmonic Heating" published by the Plasmon nano-optics research group, led by ICREA Prof. at ICFO Romain Quidant, researchers have been able to develop a novel concept in which they have been able to transform a conventional optical lens into an effective lens, called the Adaptive Photo-Thermal or APT lens, whose image focal plane can be shaped and controlled by an optical signal. The results have

been published in ACS Photonics and highlighted by Nature.




Such effective lens is capable of dynamically changing its focal plane thanks to its temperature dependence of the refractive index of matter. By covering the surface of a glass coverslip with a pattern of plasmonic nanostructures, these create the desired temperature on the lens when shined with resonant illumination. A 100micron chamber filled with water acts as the index-changing thermo-optical medium and, thus, a local increase of temperature induces a gradient of refractive index that affects the propagation of optical rays.

The results obtained from this study show promising developments in the optical engineering field, especially for future integrated optical devices. Applications that could profit from this discovery include 3D microscopy and photography.

Source:
https://www.icfo.eu/research/news2.php?id=27&id_news=2631

http://pubs.acs.org/doi/full/10.1021/ph500392c

Publication Date (Web) of this paper: January 29, 2015