

Design and fabrication of a plasmonic switching device

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Over the past decades, significant experimental and theoretical advances were made in the field of light manipulation with hybrid plasmonic nanostructures^[1]. In integrated plasmonic nanodevices, noble metal nanostructures are commonly used as building blocks because they possess geometry-dependent localized plasmon resonances which can be easily tuned^[2]. However, it has been a challenge to incorporate such nanoparticles in functional devices with a high precision in a nanometer scale^[3].

In this context, we are designing a new path selective plasmonic switching device by directing the assembly of gold hollow nanotriangles (GHTs) through the selective deposition on DNA-based scaffolds. Basic designs and predictions of the device's properties have been performed by FDTD.

In such systems, after the excitation of one tip of the structure, the resulting plasmon propagating through the other two branches will be detected via the emission of a fluorescent dye attached to their tips (Figure 1a).

GHTs are synthesized via a two-step method using silver nanoprisms as seeds^[4] (Figure 1 b) and deposited on the DNA origami with specific gold-binding sites (Figure 1 c).

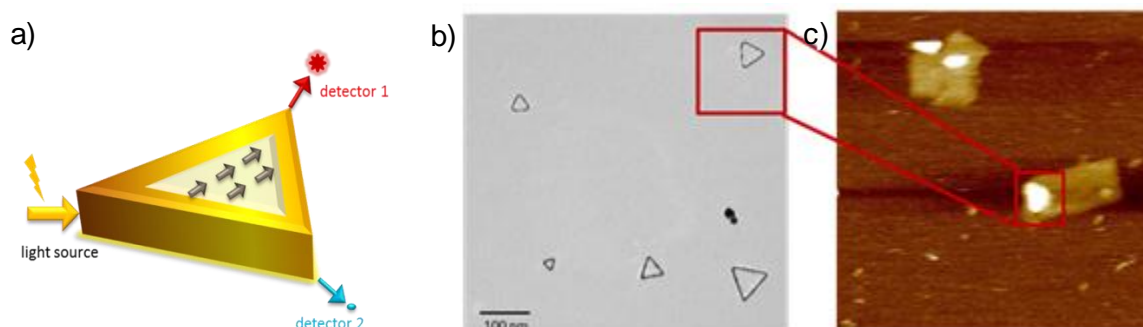


Figure 1: a) Scheme of the targeted device, b) TEM image of GHTs, c) AFM image of GHT deposited on DNA origami template

In conclusion, we are designing and fabricating nanostructures able to direct the polariton flow toward the desired direction, forming an optical switch and providing access to nanoscale light manipulation.

Acknowledgments

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^[3] A. M. Hung et al. *Nature Nanotech.* **2010**, 5, 121–126.

^[4] M. M. Shahjamali et al. *Small* **2013**, 9, 2880–2886.