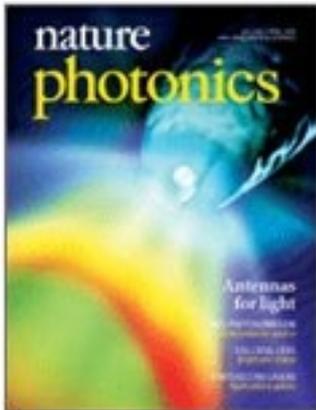


Nano-antennas can direct the visible light sent out by a single molecule, ICFO researchers report in a paper in Nature Photonics.



ICFO research, on the cover of Nature Photonics Nanometer size antennas can be used to direct the visible light of a single molecule, like conventional antennas send and receive electromagnetic waves. This finding is the topic of the paper “Optical antennas direct single molecule emission”, published in Nature Photonics advanced online edition by ICFO researchers Tim Taminiau, Fernando D. Stefani and Niek van Hulst, in collaboration with Frans B. Segerink, of the University of Twente (the Netherlands).

Antennas play a key role in modern wireless society. The electromagnetic waves sent and received by antennas are the messages that enable communication between electronic devices. Antennas with a wide variety of sizes make it possible to receive radio broadcasts, watch television and talk on a mobile phone. For an effective communication, the antenna needs to direct signals towards their intended target and, vice versa, collect signals from a desired source.



Molecule lights up close to a nano-antenna (artist impression) For an antenna to work with electromagnetic radiation in the visible spectrum, it needs to be greatly scaled down to dimensions a factor million smaller than a conventional antenna. Tim Taminiau and colleagues present an antenna, only 80 nanometer long, which operates in the optical regime. By placing the antenna near an individual molecule the light from that molecule is re-directed. The molecular message can be steered to a desired target, making

efficient communication possible.

These novel nano-antennas have important implications. In (bio)sensing, light can be sent to a molecule and, in turn, its response directed to a detector. Furthermore, the antennas can be part of efficient nano-sized light sources. It is interesting to see that the antenna designs that revolutionized communication keep finding new applications, this time at the nanometer scale.