

FET scientists solve a 100 year-old problem revisiting the notion of resonances for applications

12/01/2018

The concept of 'resonance' permeates an extremely wide range of systems in physics and engineering – from classical mechanics, electromagnetism and photonics to condensed matter, quantum physics and particle physics. Resonances play, in particular, an extremely important role in the fields of nano and chiral- biosensing, constituting the fingerprints through which we may detect proteins, cells, DNA molecules and other biological substances.



[1]

A key characteristic of resonant systems is that they cannot simultaneously store wave energy for long times and over large bandwidths. The work of ULTRACHIRAL researchers directly addresses this key limitation with the result of devising, for the first time, resonant and wave-guiding systems that can simultaneously be of very high quality and ultra-broadband.

The work, reported in the 23 June 2017 issue of the journal *Science*, is among others anticipated to open the way for much higher-throughput and sensitivity chiral and nano-biosensing, since it allows for affording simultaneously higher bandwidths of operation and interactions between lightfields and the sensed materials for much longer times.

The aim of ULTRACHIRAL is to revolutionize existing applications of chiral sensing, but also to instigate important new domains which require sensitivities beyond current limits: being able to measure chirality sensitively, in a wide range of situations, is likely to have a big impact in a variety of scientific fields and industrial sectors, from analytical chemistry to biology, as well as to the

pharmaceutical, cosmetics, food industries, and more. Some examples include the ability of measuring protein structure in-situ, in solution, at surfaces, and within cells and membranes, thus realizing the holy-grail of proteomics; the real-time chiral monitoring of terpene emissions from individual trees and forests, as a probe of forest ecology; the analysis of chirality in bodily fluids as a diagnostic tool in medicine, drug metabolism and pharmacokinetics, etc.

This [FET-Open](#) [2] project brings together world-leading groups in their respective fields. For more information on the project's consortium, objectives and achievements, please check the [ULTRACHIRAL project website](#) [3].

Project Acronym:

ULTRACHIRAL

Project website:

<http://ultrachiral.iesl.forth.gr/> [3]

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Links

[1] https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/newsroom/ultrachiral_cropped-favicon_28684.jpg

[2] <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/fet-open>

[3] <http://ultrachiral.iesl.forth.gr/>