



Research Networking Programmes

Short Visit Grant or Exchange Visit Grant

(please tick the relevant box)

Scientific Report

The scientific report (WORD or PDF file – maximum of eight A4 pages) should be submitted online within one month of the event. It will be published on the ESF website.

Proposal Title: Fabrication of a sub-mm THz metasurface lens based on an array of D-dot loop antennas

Application Reference N°: 7220

1) Purpose of the visit

The aim of this proposed short visit is to inspect the feasibility of fabrication of a proof-of-concept hardware demonstrator metasurface lens, operating in sub-mm - THz (or near IR) frequencies.

2) Description of the work carried out during the visit

During the visit characterization and functionalization of ITO and Au samples was done. With the samples, with the proposed metatronic response in the near IR region for the ITO and visible for Au, spectroscopic ellipsometry (SE), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) was done. First attempts were done to produce metasurface on ITO with electron-beam lithography (EBL), to study the test dose and conditions.

3) Description of the main results obtained

Important structural parameters of ITO were obtained (attached at the end are some pictures of the results). Findings are that our ITO layers have a plasma frequency in the 3000 nm to 5000 nm, depending on the thickness of the samples. FTIR spectra were taken to analyze the samples. SEM pictures were taken to observe the quality of the ITO and Au samples and early test of ITO layers response to EBL were done.

Large scale EBL was not possible to do since the machine suffered a malfunction and was under repairs most of the time during my visit.

4) Future collaboration with host institution (if applicable)

We will try to collaborate in the future on the topic of metasurfaces produced by EBL, once the machine is completely repaired.

5) Projected publications / articles resulting or to result from the grant (*ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant*)

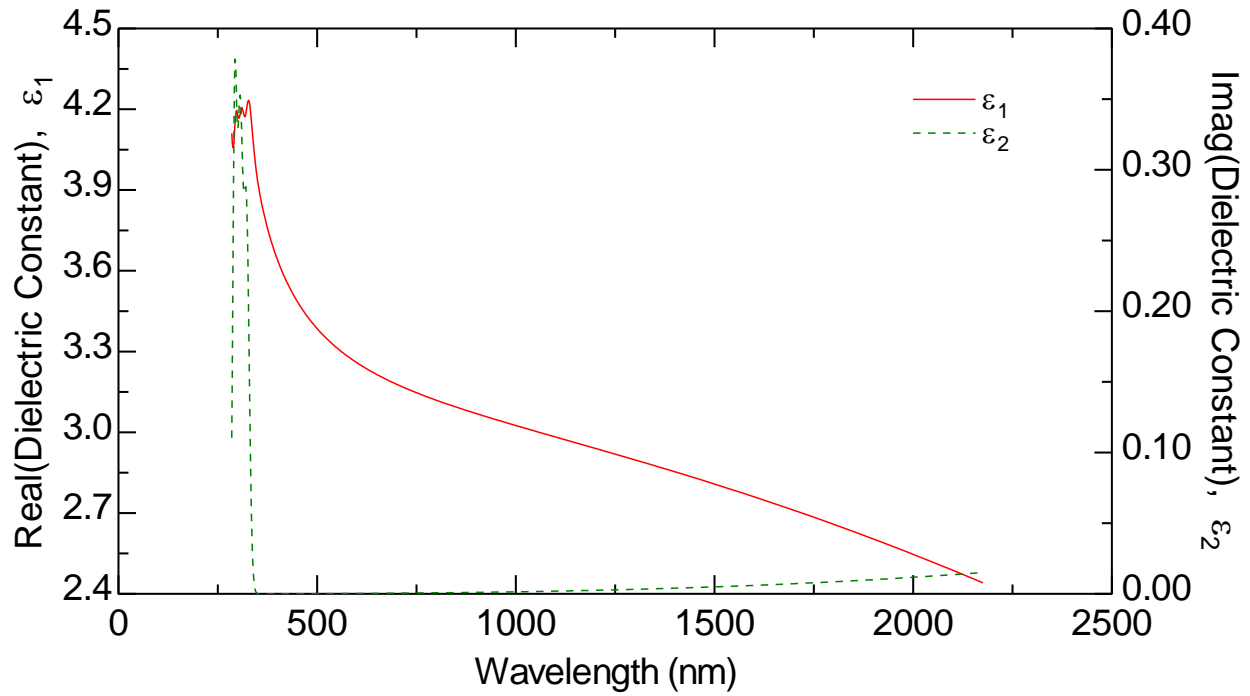
"Fabrication of a sub-mm THz metasurface lens based on an array of D-dot loop antennas"

6) Other comments (if any)

attached are some pictures of obtained results

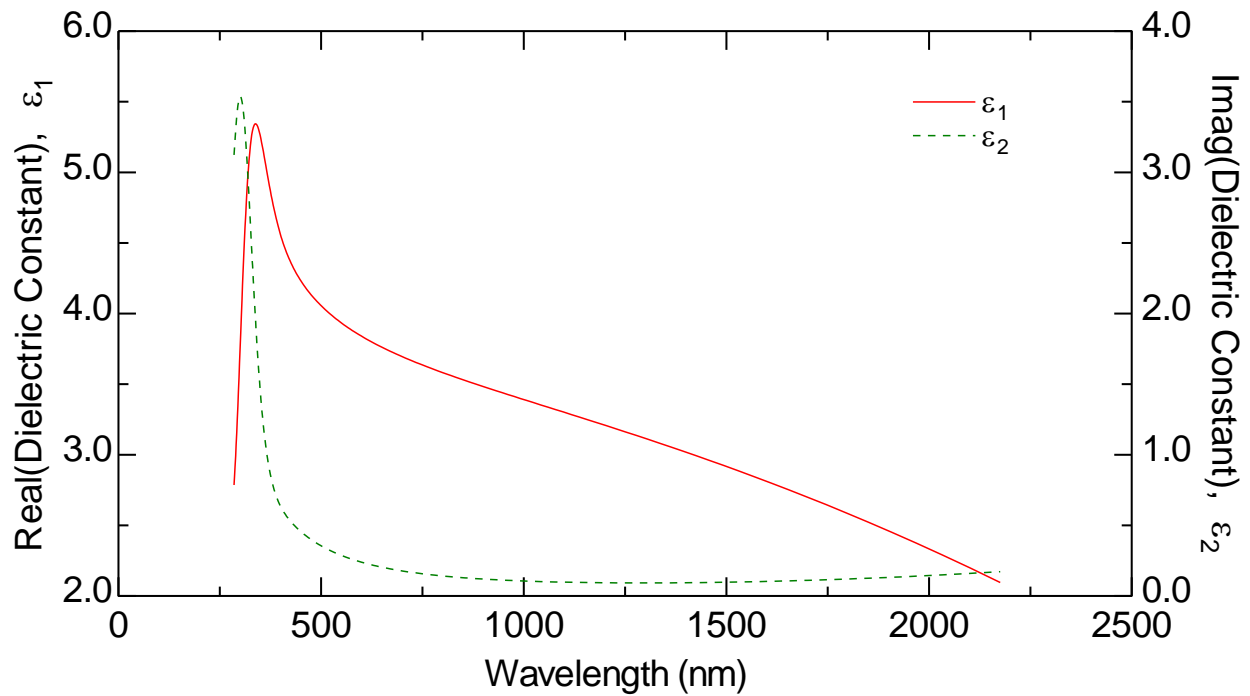
ITO 130 nm

GenOsc Optical Constants

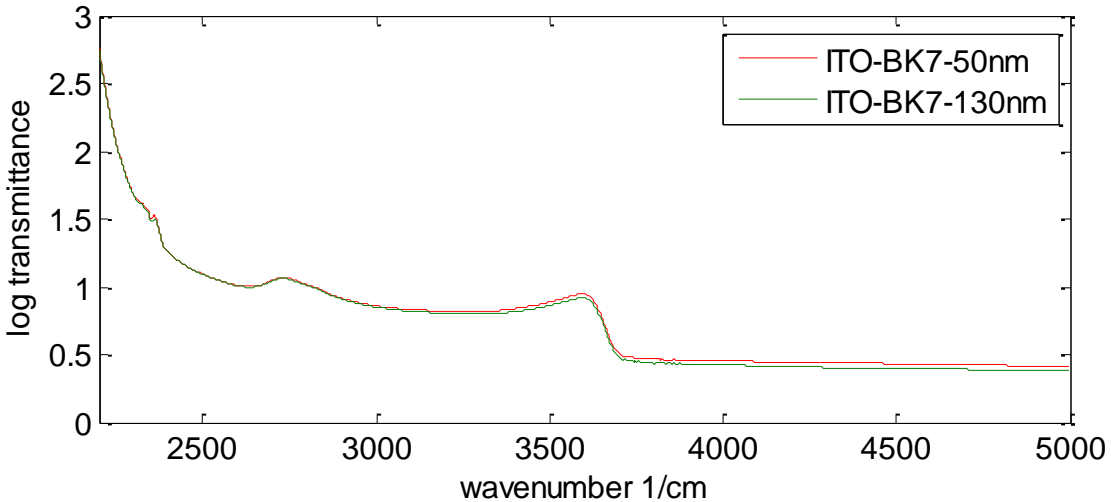


ITO 50 nm

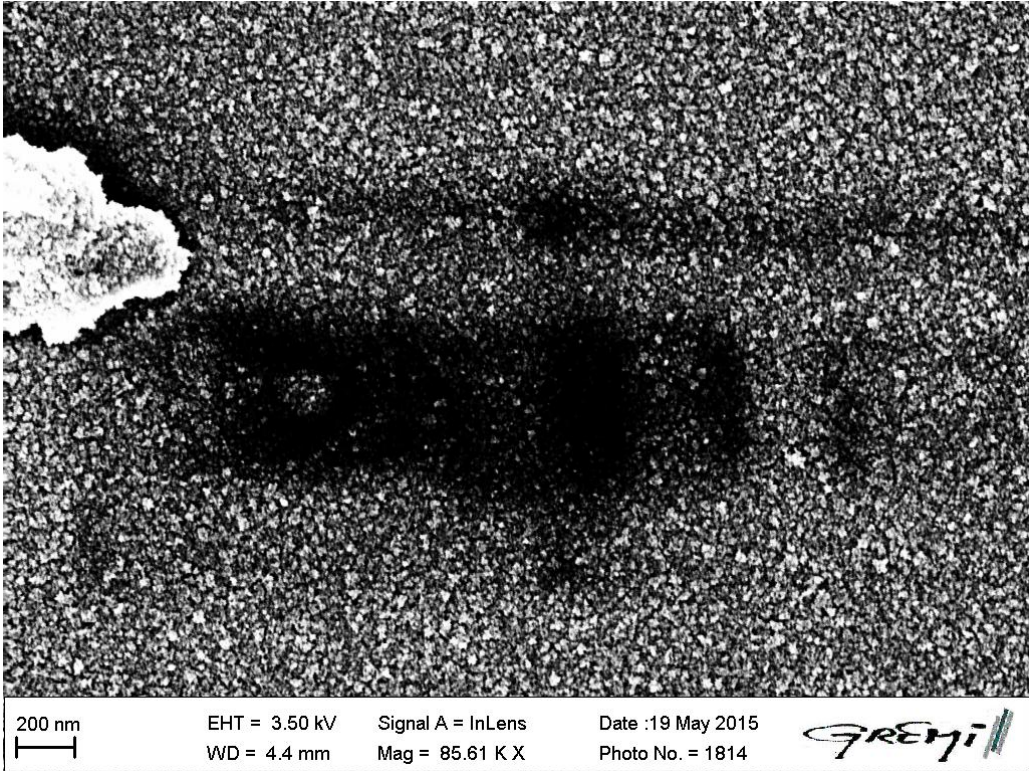
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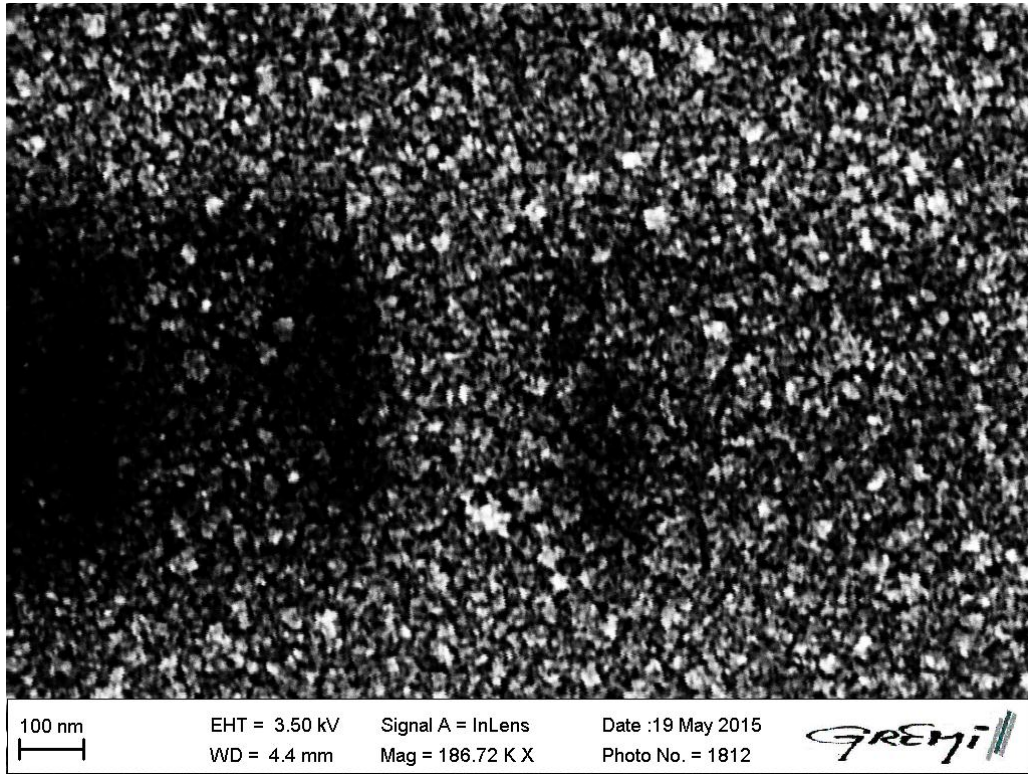


FTIR of ITO samples

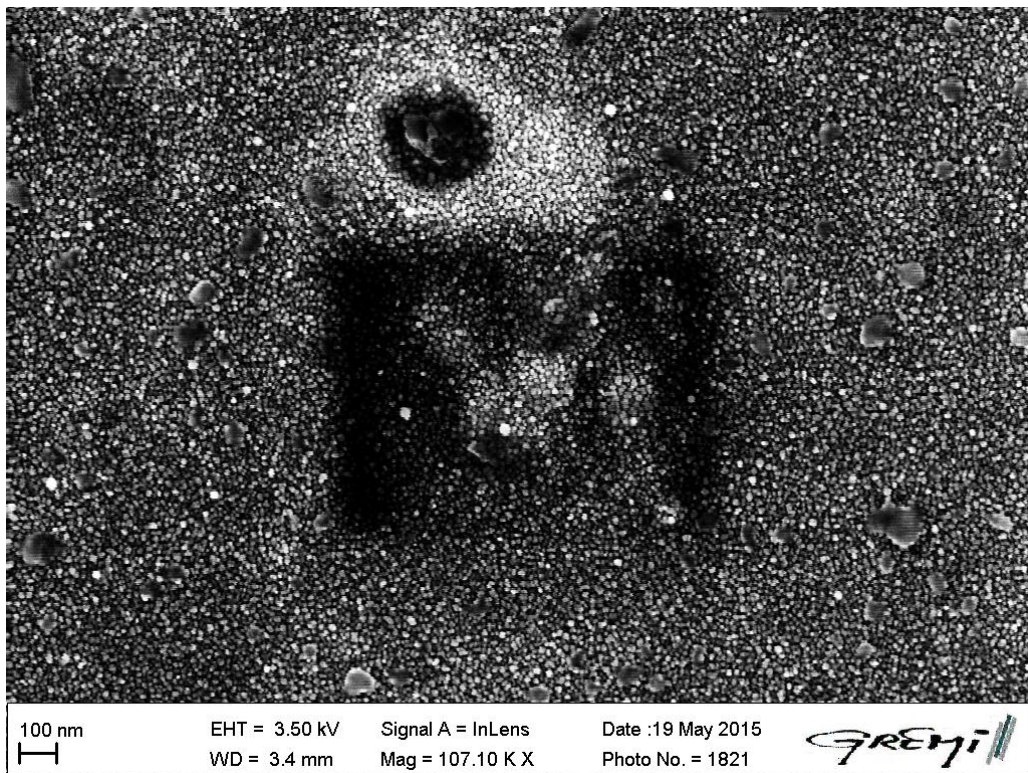


SEM of ITO 130nm with test of EBL

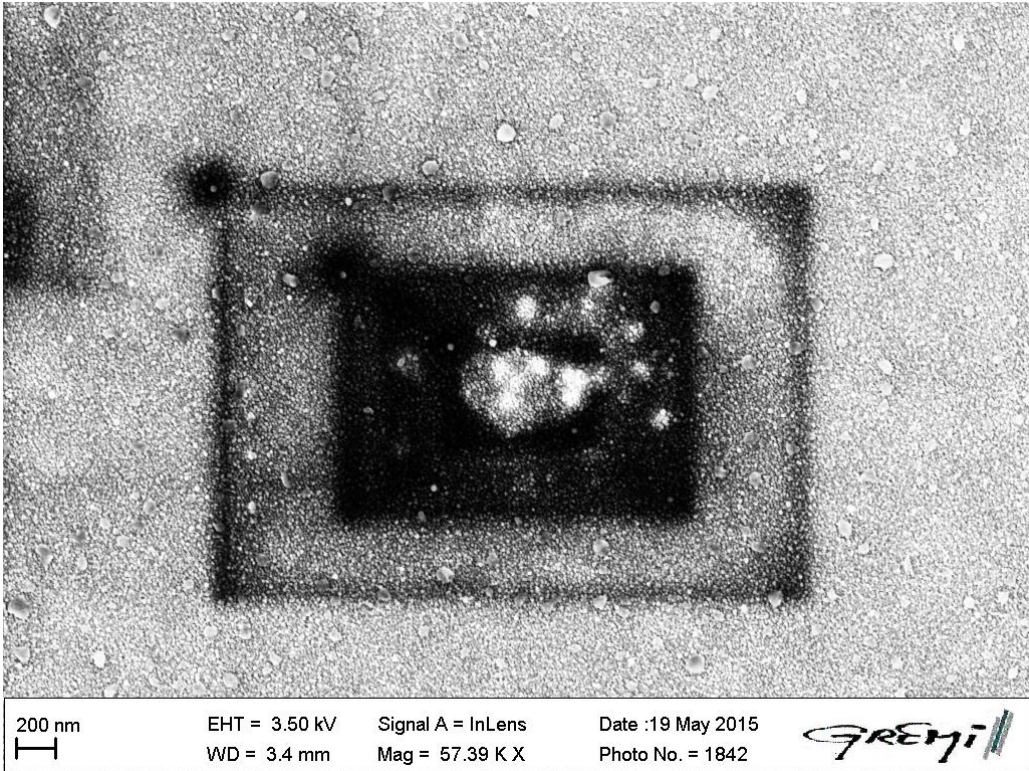
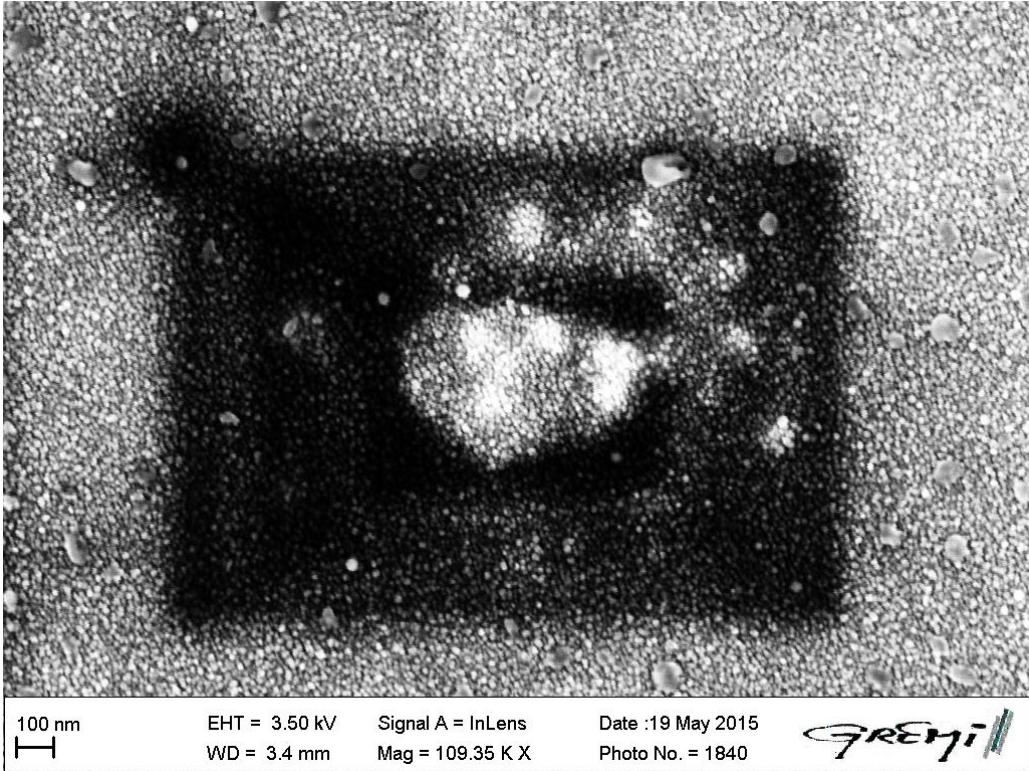




SEM of ITO 50nm layer with test of EBL



Varying doses on ITO 50nm



SEM of AU layer, side view

