## Nonlinear plasmonics

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Surface plasmons (SPO) and localized surface plasmons (LSPO) have a broad spectrum of specific properties, opening up the field for a large number of applications. This is why the interest for plasmonics is exploding both in research and applications.

The lecture selects some of those properties, which are of nonlinear character. The concentration of electromagnetic energy on some metallic surfaces, field enhancement on the surface of small (nano) metallic particles and between particle dimers (hot spots) form the base of the described phenomena. High harmonic generation, multiplasmon electron emission are also discussed in some detail.

Each of the mentioned properties are illustrated by concrete experimental observations and compared with model calculations. Three type of experimental facilities have been used for this purpose. SPO near field STM has been one of them, where the near field of SPO-s has been generated by semiconductor CW and fs Ti:Sa lasers. High intensity fs laser excited SPO emitted light has also been analyzed as well as electron beams emitted by multi-plasmon processes

Findings on some of the non-classical properties of SPO-s, as seen in different experimental observations are also presented.