INNOVATIVE MICRON-SIZE PLASMONIC COLOR SORTER (BIRAD)

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The Problem

Color generation is commonly pigmentation related, and its pixel size is limited to a few and up to tens of microns, two orders of magnitude larger than the diffraction limit in the visible range. Colors can also be generated via interference processes in photonic crystals and in plasmonic sub-wavelength structures. Plasmonic color generators transmit light over a selective optical range due to the excitation of surface plasmons. The transmitted colors depend on the geometrical parameters of the metallic nanostructures (metal type, size, shape, orientation), and can be spectrally tuned throughout the entire visible and near IR spectrum, and dynamically changed by polarization.

The Solution

The innovative micron-size plasmonic color sorter is an optical device comprising plasmonic structures, which are localized groups of nano-cavities, milled in smooth metallic films. These structures, upon illumination with white light, are capable of localizing hybridized plasmonic frequencies (modes), which eventually transmit tunable colors. The latter is obtained by structures sized few hundred nanometers to ~1 micron in length and width. Alongside the observation of colors, there is also a strong and confined electromagnetic "spot" of a few dozens of nanometers which is centered by these structures, in the middle of the plasmonic component. The transmitted light can be dynamically controlled by the linear polarization of the incoming white light, and by thus easily switched between two colors or more in situ.

The Commercial Benefit

Our micron-size plasmonic color sorter is expected to hve a significant impact on fields such as: color displays, optical components, nano-labeling and anti-counterfeit, and surface enhanced vibrational spectroscopy (raman). The plasmonic device can be implemented into existing technologies, or developed as a sole entity.

Market Potential

Nano-labeling is an in-vitro protein labeling method. The global protein labeling market size is expected to reach USD 2.60 billion by 2024 registering a CAGR of 9.3% during the forecast period.

Target Markets/Industries

protein labeling market
optical components and systems market
anti-counterfeit market

Intellectual Property
Patent Pending

Team: Primary Inventor

Dr. Adi Salomon

Dr. Adi Salomon obtained her PhD from the department of Materials and Interfaces at Weizmann Institute of Science with David Cahen. There she got a scientific background on surface chemistry, semiconductors and electron transport through organic molecules.

Dr. Adi Salomon worked with Thomas Ebbesen, in Strasbourg, on the interaction between molecules and surface plasmons. Dr. Salomon's research was the first to demonstrate the dynamics of interaction between surface plasmons and molecules throughout the development of a new surface photochemistry.

Later on, at the Weizmann Institute of Science, together with Yehiam Prior, Tamar Seideman, Robert Gordon and Maxim Shukaharev, she developed a new model to explain interactions between molecules that are immersed in the plasmonic field'.

Salomon's lab, at Bar-Ilan University, is investigating the interaction between molecules at light at

the nano scale, and real time imaging of electrodes surfaces as part of INREP group.

Future Research

Incorporation of sensors into "real-world" devices using new or existing technologies
Optimization of the sensing abilities using selective/specific binders for a set target of analytes
Collaboration with machine learning experts for development of smart algorithms, to be used as fast and accurate recognition tools

The Opportunity

We invite companies to license our patent through a licensing agreement with a sponsored research.

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