Silicon Photonics STED
Plasma Dispersion Effect
Super-Resolved Imaging in Silicon

The Problem

The silicon industry is currently heading toward 10 nm technology in integrated circuits. Promoting this market trend is largely dependent on the development of super resolution in silicon microscopy.

The Solution

We propose a novel method that provides the ability to probe the silicon under surface in super resolution.
More specifically, we developed a new concept for beam shaping of an IR probe laser beam in the silicon by a second pump laser beam in the visible, absorbed in the silicon. The pump beam creates photo-charges that block the IR beam according to the lateral shape of the pump beam via the plasma dispersion effect. The pump beam could be either in a sharp Gaussian shape that induce a hole in the center of IR probe beam or the pump beam is in a donut shape that blocked the IR beam while living a sharpen beam in its center.

The Commercial Benefit

Our cutting-edge, unique innovative method:

- Serves as an extremely important tool in the field of nanoelectronics such as ICs failure analysis
- Induces higher spatial frequencies and allowed super-resolution
- Is in similar to the STED technique in fluorescence microscopy
- Can be applied in other semiconductors

Market Potential

The silicon photonics market is estimated to be worth USD 774 Million in 2018 and is expected to reach USD 1,988 Million by 2023, growing at a CAGR of 20.8% between 2018 and 2023. The market drivers are

- Rising demand for silicon photonics based products in data centers
- Reduction in power consumption with use of silicon photonics based transceivers
- Growing requirement of high bandwidth and high data transfer capabilities

Target Markets/Industries

- Data center and high-performance computing
- Telecommunications
- Military and defense
- Aerospace

Intellectual Property

Patent pending

Team: Primary Inventor

Prof. Sinvani Moshe
Prof. Sinvani received his PhD in sol. st. physics in Bar-Ilan university.
Prof. Moshe Sinvani –graduated his post Doc. at Caltech (California Institute of Technology) in surface physics at liquid He temperatures.
He acted as a Senior Researcher at the Night Vision R&D division at RAFAEL and as a senior researcher at Soreq NRC, thermoelectric material R&D, IR technologies, laser interaction with materials and EO devices.
Prof. Sinvani investigates storage of energy in high Tc super-conductors, optical modulator on silicon and optical super resolution in silicon.

Future Research

Super resolution for laser scanning microscopy in silicon ICs.
Development of mini rig for drawing of special fiberoptics

The Opportunity

We are looking for investors that are willing to support the research and commercialize this novel invention.

Keywords

- Plasma Dispersion Effect
- Silicon Photonics STED
- Point Spread Function
- Super resolution in Silicon