

## Optical Devices Enabling Efficient Conversion of Radiation Wavelength and Efficient Nonlinear Absorption of Radiation (Yisum)

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### Novel concept to enhance incoming electromagnetic radiation in order to convert and detect IR radiation

<b>Categories</b>	Micro & Opto Electronics, Nanotechnology, Optoelectronics / Photonics
<b>Development Stage</b>	Proof of concept; ongoing development
<b>Patent Status</b>	Patent application filed in the United States

#### Highlights

- Electromagnetic radiation is frequently received in a broad range of wavelengths not all of which are useful for any particular application.
- IR and near-IR radiation, in particular, require special devices for conversion to useful electric signals
- This results in a need for optical materials and devices that can actively convert the incoming wavelengths into others that are more useful or to absorb and convert them to electrical signals using common devices sensitive only to the visible spectrum.
- This novel concept enables broadband electromagnetic radiation amplification using metallic nanostructures, and enhanced light up-conversion and detection using non-linear properties in a wide variety of materials.

#### Our Innovation

Concept for the development of optical devices that actively enhance incoming electromagnetic radiation in special metal-dielectric nonlinear optical nanostructures that improve the conversion of incoming wavelengths to wavelengths in a more useful region, and boost the direct detection efficiencies of the radiation.

#### Key Features

- Can provide improved spectral sensitivity for photodetectors
- Enables applications that presently could only take place with the reception of a high light intensity to be carried out with reception of a lower light intensity
- Enables efficient conversion of IR or near IR radiation to visible light
- Enables the development of improved light upconversion devices for military and civilian applications.
- Can increase the efficiency of solar cells

#### Development Milestones

- Seeking funding for ongoing development and industrial cooperation

#### The Opportunity

- This invention can be applied in a large range of applications from simple, low-cost

semiconductor-based detectors for IR radiation to more efficient solar panels and night-vision equipment.

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