

# SnIP: A new semiconductor material

Reference No: 75074

## CHALLENGE

The new substance tin phosphor iodide (SnIP) consists of the elements tin (Sn), iodine (I) and phosphorus (P). This new substance is expected to appear in at least two chapters of future standard teaching books. This is the first inorganic material with a double-helical structure as well as a new semiconductor material. This second aspect in particular opens many interesting technical possibilities.

## INNOVATION

SnIP and its analogues represent a new, exotic material with an unusual combination of interesting features:

- Semiconductor with a bandgap in the range of 1.8eV
- Photoluminescence ( $\lambda_{\max} = 670 \text{ nm}$ )
- Nanowires with a diameters of  $\sim 5 \text{ nm}$  and lengths over centimeters
- Thermal stability up to  $500 \text{ }^\circ\text{C}$
- Non-toxic

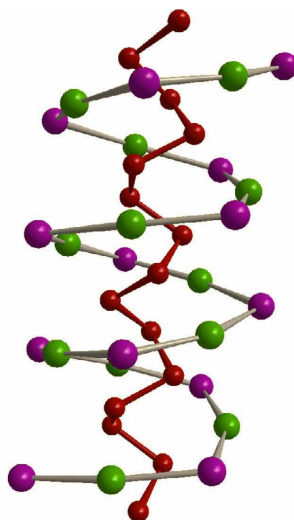
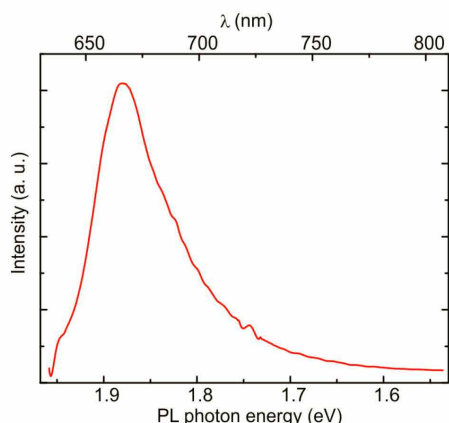
With these features and low-cost synthesis, outstanding application possibilities in the field of photovoltaics and in the LED sector can be expected. However, similar to graphene, it is to be expected that various other unconventional applications will be discovered. For example, it is conceivable to use the flexible nanowires for the contact-connection of semiconductor structures.

## COMMERCIAL OPPORTUNITIES

- Sensor
- Solar
- Light source

## DEVELOPMENT STATUS

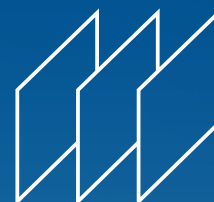
Basic experiments succesful.



**Figure:** Room temperature photoluminescence measurement on a SnIP needle featuring a minimum recombination energy of 1.86 eV (**left**). New double helix structure SnIP with a phosphor-axis (red) wrapped with an alternating tin iodine (green, purple) chain (**right**).

## REFERENCES:

- 1 D. Pfister et al.; „Inorganic Double Helices in Semiconducting SnIP“ Adv. Mat. 28 44, 9783-9791 (2016).
- 2 WO 2017/008979; EP 3 319 903 A1.



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