



Solid State Institute  
המכון למצב מוצק

TECHNION  
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הטכניון  
מכון טכנולוגי  
לישראל

**SEMINAR**

**סמינר**

## **On the transition from photoluminescence to thermal emission and its implication on solar energy conversion**

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### Abstract

Photoluminescence (PL) is a fundamental light-matter interaction, which conventionally involves the absorption of energetic photon, thermalization and the emission of a red-shifted photon. Conversely, in optical-refrigeration the absorption of low energy photon is followed by endothermic-PL of energetic photon. Both aspects were mainly studied where thermal population is far weaker than photonic excitation, obscuring the generalization of PL and thermal emissions. In this talk I will present our experimental study on endothermic-PL at high temperatures. We show how, in contrast to Planck's emission, PL photon rate is conserved with temperature increase, while each photon is blue shifted. Further rise in temperature leads to an abrupt transition to thermal emission where the photon rate increases sharply. We also show how endothermic-PL generates orders of magnitude more energetic photons than thermal emission at similar temperatures. Relying on these observations, we propose and study thermally enhanced PL (TEPL) for highly efficient solar-energy conversion, with thermodynamic efficiency limit of 70%.

**ההרצאה תתקיים ביום רביעי, ה-6.1.16 בשעה 12:30**

**בבניין המכון למצב מוצק, בחדר הסמינרים**

**The lecture will take place on Wednesday, 6.1.16 at 12:30**

**at the Solid State Institute, seminar room**

**Organizer: Associate Professor Oren Cohen**