

הנדך מוזמנות להרצאה סמינריונית במסגרת הדוקטורט של הפקולטה להנדסת מכונות,
שתתקיים ביום ה' 13.09.2018 (ד' בתשרי, תשע"ט), בניין דן קאהן, אודיטוריום 1, 13:30.

מרצה: נמרוד קריגר

מנחה: פרופ' ח כרמל רוטשילד

על הנושא:

Photo-Luminescence and Thermal Devices for Solar Energy Harvesting

The seminar will be given in English

תקציר ההרצאה:

Solar energy is now the fastest growing industry in the energy economy, having far reaching effects on the power grid in many countries. This development, owed in part to the drastic PV manufacturing cost reduction, brings forth the more problematic aspects of solar energy. Low conversion efficiencies of conventional Si PV cells, and the intermittent nature of solar power, place a barrier for full adoption of solar as the primary power source.

In this work we present two novel concepts with potential to change this picture. Thermally enhanced photoluminescence (TEPL) offers a device with conversion efficiencies much higher than what is common for simple, single junction, PV cells. We exploit the conservation of photon rate in endothermic-photoluminescence (PL) with temperature increase, leading to emission blue-shifting and higher conversion efficiencies in the PV cell. The second concept, luminescent solar power (LSP), takes a more direct route to harvest sunlight excited PL absorber by spatially separating the heat from the free energy of the incoming sunlight. This scheme minimizes the heat load on the PV cell and allows maximal heat extraction from the PL absorber; potentially used later for thermal storage and electricity production. This technology may drastically reduce cost of concentrated solar power with thermal storage, and lead to broader adoption of solar energy.

Answering the main challenge of these concepts, we identify and demonstrate efficient absorbing and emitting materials, specifically rare-earth doped YAG crystals. We present their optical properties and explain how with these materials high LSP and TEPL conversion efficiencies are just around the corner.

בברכה,

פרופ' נח אתיו סאס

מרכז הסמינרים