

סמינריון

הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 21.05.15 (ג' בסיון, תשע"ה), בניין דן-קאהן, קומה 0, אודיטוריום 1, 14:30.

ירצה: אנטולי פרחובניק

מנחה: פרופ"מ גלעד יוסיפון

על הנושא:

## **Gas to Gas Microfluidic Heat Exchanger: Axial Conduction and Compressibility Effects**

להלן תקציר ההרצאה:

Micro heat exchangers (HE) are of particular interest due to their higher heat exchange efficiency and reduced weight and size as well as energy consumption. However, in contrast to macro size HE, heat transfer and fluid flow correlations and the systematic design procedures are not yet well established for micro HEs. A unique experimental setup was designed for studying counter-flow heat-exchangers with large inlet temperature range and elevated pressures (up to 40 MPa) using Nitrogen as the fluid. A Counter-Flow Heat Exchange (CFHE) made of an array of many microchannels was designed, fabricated and tested. The studied HE is fabricated using standard photolithography techniques and is made of a combination of Silicon and glass wafers. Divergence from classical heat exchanger theory is observed due to discernible axial conduction effects. Hence, device performance was evaluated using a modified NTU approach that includes also axial conduction effects. As a conclusion, in order to reduce axial conduction and increase HE efficiency, heat exchanger should be made from materials with moderate heat conduction coefficient, e.g. glass. An additional study involved a chip consisting of a single microchannel all made of glass. Choking behavior due to compressibility effects is observed which limits the maximal possible flow rate. In particular, its coupling to the heat transfer problem by varying the inlet temperature was studied for the first time.

בברכה,

פרופ' נא אמיני

מרכז הסמינרים