

סמינריון

הנדך מוזמנת/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 13.02.2020
(י"ח בשבט, תש"פ), בניין דן קאהן, אודיטוריום 1, 45:13.

מרצה: אולגה פונריוב

מנחה: פרופ' דניאל ריטל

על הנושא:

Evaluation of the static fracture toughness of advanced ceramics

The seminar will be given in Hebrew

תקציר ההרצאה:

The resistance of the material to a crack extension is an important mechanical property called the static fracture toughness, noted K_{Ic} .

Fused silica, investigated in the present work, is a non-crystalline form of silicon dioxide. This material has a great technological potential for highly demanding applications which take advantage of its superior properties like low coefficient of thermal expansion, high resistance to thermal shocks, good chemical resistance, good corrosion resistance, high radiation resistance and excellent wear resistance.

The specimens in present study were all pre-cracked with a sharp crack introduced through the extension of hardness indentation in controlled bending. The static fracture toughness was determined experimentally, on specimens with straight sharp cracks. From an experimental point of view, the selected approach overcomes problems related to the crack-tip sharpness and the usual approximations/shortcuts made during indentation toughness testing. Two batches of fused silica specimens, produced from same bulk material with two-month period between the orders, were tested by using a Single Edge Pre-Cracked Beam (SEPB). The measured by this method static fracture toughness of the first batch was found to be 0.78 ± 0.31 [$\text{MPa}\sqrt{\text{m}}$] and that of the second batch specimens was found to be 0.75 ± 0.05 [$\text{MPa}\sqrt{\text{m}}$]. By contrast, the measured by Chevron Notched Beam (CNB) method fracture toughness of fused silica carried out at Rafael was determined to be 0.67 ± 0.03 [$\text{MPa}\sqrt{\text{m}}$], a significantly lower, and most likely less reliable, value.

The fracture surfaces of three test specimens with low, average and high fracture toughness values were analyzed. It was observed that the specimen with lower fracture toughness value exhibits more trans-granular cleavage, comparing to the fracture surface of higher toughness specimens.

The present study proposes and discusses an accurate procedure for static fracture toughness measurement in accordance with the requirements of ASTM C-1421 standard.

בברכה,

ד"ר אוריאל סאס

מרכז הסמינרים