סמינר מחלקתי – הנדסת חומרים

הנך מוזמן בזאת לסמינר אשר יתקיים ביום ה', 26 באוקטובר 2017, ו' בחשון תשע"ח
בשעה 14:00, בניין 51 חדר 15 (באודיטוריום)

Properties of cathodes based on $(La_{1-x}Sr_x)_2(Ni_{80}Mn_{20})O_{4+\delta}$

Yatir Sadia
Advisor Professor Yaniv Gelbstein

Solid oxide fuel cells (SOFC's) have been at the forefront of energy research in the past few years. This has been due to the fact the SOFC's provide a fully solid platinum free conversion mechanism of fuel to energy. In addition SOFC's are very versatile and can use a range of fuels such as hydrogen, natural gas, NH_3 and many more. SOFC's allow for up to 65% efficiency of conversion with up to 90% efficiency if waste heat is recovered for heating. The main problem with SOFCs is their high operation temperature. The high temperature tends to cause high costs and high degradation compared to other conversion techniques. One way to overcome this problem is find materials that can operate in lower temperatures. La_2NiO_4 (LNO) is a well-known K_2NiF_4 type oxide which has been suggested as a cathode for IT-SOFC due to the high electronic and ionic conductivity. However the surface exchange of LNO is should still be improved in order for it to be used in practical applications. Recently 10% Mn and Sr substitution has been shown to increase the surface exchange in LNO. However in order to stabilize the K_2NiF_4 structure the addition of manganese requires and addition of Sr as well. While a 1:1 ratio of the Sr-Mn seems to be stable, changing this ratio can change the oxidation state of Mn and Ni in the compound and as such change the fundamental properties of the compound. In this research the effect of changing the Sr-Mn ratio in $(La_{1-x}Sr_x)_2(Ni_{1-y}Mn_y)O_{4+\delta}$ compounds on the mixed conductivity, and surface exchange was determined. This was correlated to the change in the oxidation state of Mn and Ni in the compounds.