Studies of fusion cross sections of Te and Sn isotopes with a $^{64}$Ni target at energies near and below the barrier

D. Shapira$^1$, J. F. Liang$^1$, C. J. Gross$^1$, R. L. Varner$^1$, J. R. Beene$^1$, A. Galindo-Uribarri$^1$, J. Gomez Del Campo$^1$, P. E. Mueller$^1$, D. W. Stracener$^1$, J. J. Kolata$^2$, H. Amro$^2$, W. Loveland$^3$ and K. L. Jones$^4$

1 Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA
2 Physics Department, University of Notre Dame, Notre Dame, IN 46556, USA
3 Department of Chemistry, Oregon State University, Corvallis OR 97331, USA
4 Department of Physics and Astronomy, Rutgers University, Piscataway, NJ 08856, USA

Our system for high efficiency studies of evaporation residues from reactions induced by heavy radioactive ion beams (120 $\leq$ A $\leq$ 150) on medium mass targets (50 $\leq$ A $\leq$ 100) [1] was used to measure evaporation residue production on several isotopes of Sn and Te bombarding a $^{64}$Ni target at energies near and below the coulomb barrier (Fig. 1). New data will be presented on a series of Te isotopes ranging from $^{124}$Te to $^{134}$Te as well as $^{134}$Sn colliding with a $^{64}$Ni target.

A semiclassical code, based on the WKB approximation, to calculate sub barrier fusion was developed. It calculates the probabilities for heavy ion fusion for each partial wave separately. Barrier distributions are folded with the transmission factors to account for inelastic excitation and a formalism to deal with neutron transfer, based on a proposed treatment introduced by Zagrebaev [2], was implemented. This code is used to study the role of neutron excess, neutron binding energies and the probabilities for neutron transfer on the sub barrier fusion cross sections for reactions induced by heavy neutron rich nuclei.

![Figure 1: Evaporation residue cross sections for $^{124}$Sn, $^{134}$Te and $^{132}$Sn](image)

References