

# **Isolation and Study of Bacteria Using Physical Constrictions**

Nil Tandogan

Department of Chemical Engineering  
Northeastern University  
Boston, MA, 02115

**Tuesday, November 19<sup>th</sup>, 2013**

**Dodge Hall, 450 A and Center**

**1:00 pm**

This thesis proposes methods for the isolation and study of bacterial cells by using physical constrictions. Using a conceptually simple microfluidic device with nano-scale constrictions, it is possible to isolate individual bacterial species from infinitely complex mixtures. To demonstrate this principle, we sorted red and green fluorescently labeled *E. coli* and *P. aeruginosa* from *E. coli*. Two *E. coli* strains that were labeled with different fluorescent colors were also sorted to show that trapping a single species within the constriction blocks other species, and even other strains of the same species, from reaching the isolation chambers. In addition, a polycarbonate membrane will be integrated to PDMS microfluidic devices to adapt this platform to in-situ studies to culture uncultivable microorganisms. The third aim of this project will focus on bacterial behavior. Microfluidic devices will be used to provide new insights about biofilms. Finally, as a fourth aim, the ability of common and pathogenic bacteria to migrate through porous media as a function of pressure and material will be investigated. This study will provide valuable new information regarding the effectiveness of water filtration and sterilization processes.