

# 2008 Ohio Student Research Forum

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## RESEARCH ABSTRACT FORM

**TITLE:** Enzyme Delivery Systems for Silicon-Based Materials 5598428

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### **Introduction**

Free enzymes have many limitations in organic media such as deactivation, stability, dispersion, recovery, etc. In this research I am investigating delivery systems that will address these problems for silicon-based materials.

### **Enzyme Immobilization**

The water-soluble enzyme lipase is used in the hydrolysis of ester bonds, and has applications ranging from baking and laundry detergents to biocatalysis in alternative energy methods. The focus of this investigation is the effect of different pH buffer solutions on lipase from *Candida Rugosa* immobilized on porous silica beads. An aqueous enzyme solution was created here by adding different pH buffer solutions to the enzyme lipase. The enzymatic solution was then mixed with porous silica particles and completely dried. The enzyme activity was measured using gas chromatography (GC). It was discovered that the activity increases as the pH of the buffer solution increased until a buffer solution at pH 6, above which the activity decreased.

### **Emulsions Containing Enzymes**

Silicone emulsions are colloidal suspensions consisting of the silicone, the emulsifier, and other liquid substances. An enzymatic solution of lipase *Candida Rugosa* and a buffer solution at pH 6 are added to poly(dimethylsiloxane) (PDMS). The immiscible mixture was sonicated in order to prepare the emulsion. The application of this emulsion will be to improve our enzyme immobilization techniques and thus enzyme stability.