

- 1) Student name: Adam Sundholm
- 2) Faculty mentor name: Prof. Franklin Tao
- 3) Project title: Synthesis of Nanocatalysts for use in the conversion of Methane to Methanol.
- 4) Briefly describe any new skills you acquired during your summer research: I learned the application aspect of synthesis and the use various methods of synthesis such as volumetric mixing, the mixing of exactly the amount of liquid that would fit in the pores with the porous zeolite.
- 5) Please briefly share a practical application/end use of your research: The end purpose of this research is to find a more practical way to use our remaining fossil fuels in laboratory work as the modern day creation of methanol is very impractical as to where it should be.

Project Summary: The research focus this summer was centered on increasing the conversion rate of Methane to Methanol using a variety of nanocatalysts that we synthesized. These catalysts were normally metals doped onto mesoporous zeolites such as TS-1 and ZSM-5. Zeolites have a special property that their pores force molecular interactions that would not normally be seen between two distinct molecules such as hydrogen peroxide and methane. These unique interactions were the cause of the relatively high conversion rate that we were studying.

The reaction itself involved mixing water as a solvent with hydrogen peroxide and the catalyst of the day. They would then be placed in a high pressure and temperature container that would be sealed and then mixed with methane. It would be raised to a particular temperature and then the reaction would be allowed to run its course. Most of the time NMR was used to examine the products found in the end result and then compared with previous results so as to choose new synthesis choices.