FAMU - FSU COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
2525 Pottsdamer Street
Tallahassee, Florida

Tag Meeting No. 2

Friday, October 7, 2016
12:00 noon – 1:30 pm, Room Building A 127A

Minutes

Project Title Multifunctional Energy- and Space-Saving Reactor for the Treatment of Landfill Leachate. Year II. Incorporation of Electrocoagulation
Tag Members: Peter Grasel, Joe Dertien, Owete Owete, John Hallas, Chen Lin, Hafiz Ahmad, Matthew Hendrix and Youneng Tang
Principle Investigators: Gang Chen and Kamal Tawfiq
In Attendance: Peter Grasel, Joe Dertien, Owete Owete, Chen Lin, Hafiz Ahmad (through Gotomeeting), Youneng Tang, Boya Wang, Simeng Li, Runwei Li, Zhiming Zhnag, Yi Xiong and Gang Chen

A website has been developed for this research (www.eng.fsu.edu/~gchen). All the information regarding this project has been uploaded to this site to facilitate the dissemination of the research discovery.

Agenda

1. Project Overview
Detailed information is available at http://www.eng.fsu.edu/~gchen

2. Experimental Design and Setup

3. Arsenic Removal
Arsenic removal was found to be influenced by electrical current (i.e., current density), reaction time and pH during electrocoagulation. With electrocoagulation, the released iron was subjected to hydrolysis and arsenic removal was achieved by its strong adsorption with precipitated ferric iron hydroxide. Therefore, desired hydrolysis time was required for arsenic removal. From this research, it was discovered that reaction time of 30 minutes was required for proper arsenic removal by electrocoagulation. High current density led to increased decomposition of the electrode material and enhanced arsenic removal.

4. Phosphorous Removal
Phosphorus removal was found to be influenced by pH during electrocoagulation. With electrocoagulation, the released iron formed ferric iron hydroxide through hydrolysis, which had strong adsorption for phosphorus. In this research, we discovered that neutral pH was preferred

for phosphorous removal. During adsorption, phosphorus replaced singly coordinated OH^- groups and then reorganized into a very stable binuclear bridge between the cations. This adsorption process was coupled with the release of OH^- ions, thus this process was favored by low pH values. However, low pH prevented ferric iron hydrolysis. Neutral pH seemed to be the suitable range for phosphorous removal by electrocoagulation.

5. Dissemination Plan for this Project

6. Potential Funding Sources for the Continuation of Related Research

— NSF/CBET/Environmental Engineering
— EREF

7. Discussion

Following are the issues raised in this TAG meeting:

a. Wetland applications for the treatment of landfill leachate:
   Usage of wetland for the treatment of landfill leachate at Perdido Landfill, Escambia County was discussed.

b. Iron release under reducing conditions in Northwest Florida and groundwater contamination with iron was discussed.

c. Groundwater recharge policy by FDEP was revisited.

d. Sludge collected from surface water treatment plants was used in this research. The TAG members suggested a water treatment plant at Panama City be as a potential source of the sludge.

e. The technology of this research was further discussed. Leachate characterization is required before implementation of this technology. The treatment system needs to be tailored for specific contaminant.

f. The solid precipitate from the leachate is suggested to be separated from the leachate and disposed separately.

g. Leachate recirculation in this research was discussed.

h. Iron in the leachate may be removed by pH adjustment and subsequent precipitation. Iron precipitation also promotes arsenic removal. If the arsenic content is much higher than that of iron, iron addition is required which can be achieved by electrocoagulation with element iron electrode in this research.