

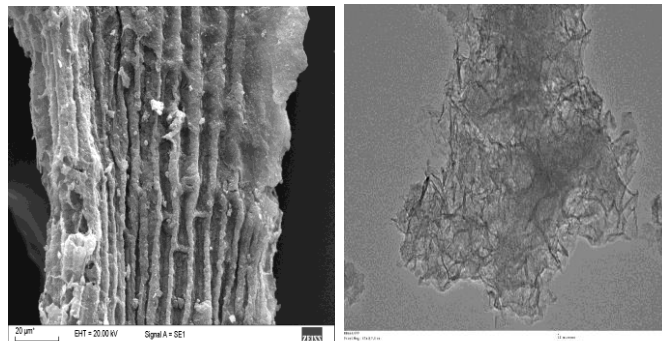
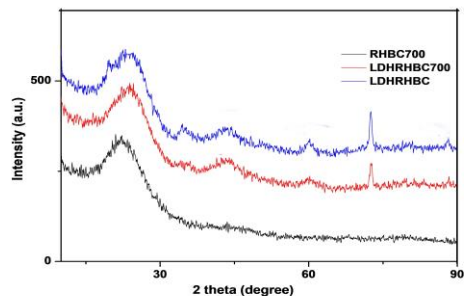
## Introduction

- “Any synthetic or naturally-occurring chemical or any microorganism that is not commonly monitored or regulated in the environment with potentially known or suspected adverse ecological and human health effects” Emerging Contaminants
- The extent of pharmaceuticals in the environment shows the presence of >630 different pharmaceuticals from >70 countries.
- Acetaminophen recognized as one of 95 wastewater contaminants by a National Reconnaissance completed in 1999-2000 in 139 U.S. streams.
- Different engineered biochars from various biomass have been developed for aqueous pharmaceuticals sorption.

## Development of Engineered Biochars

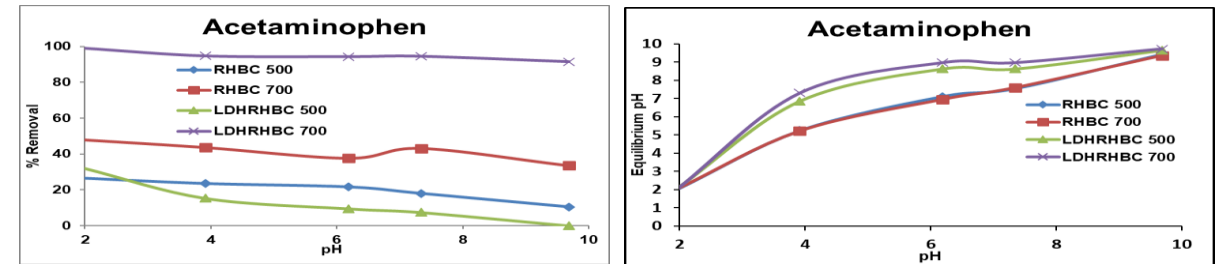


## Characterization of Engineered Biochars

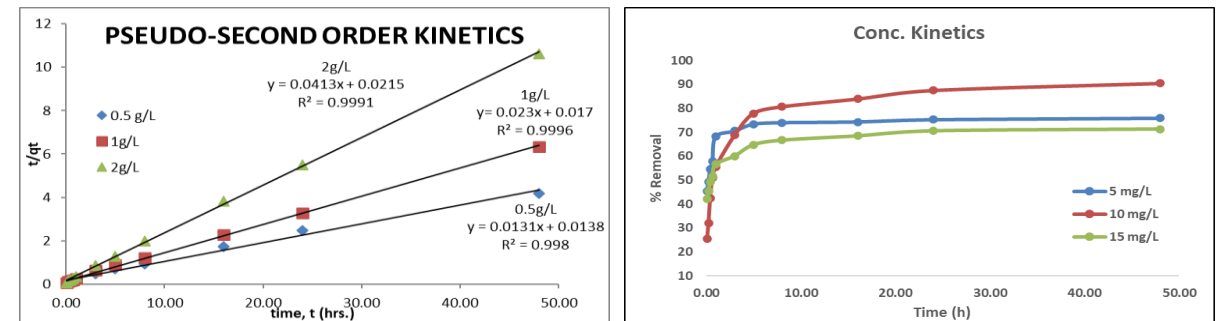


## Result and Discussions

- Effect of pH on the sorption of Acetaminophen on engineered Mg/Al biochars prepared at 500 and 700°C and their pristine biochars (Conc. 10mg/L, Dose 1g/L, Temp. 25°C, Eq. time 24hrs)



- Effect of initial concentrations (5, 10, and 15 mg/L) and adsorbent dose (0.5, 1.0, and 2.0 g/L) on sorption Kinetics at 25°C (Time: 5m - 48h, Equ. time ~10 h)



## Conclusions

- This study shows the successful application of engineered biochar for the sorptive removal of Pharmaceutically Active Compound (Acetaminophen).
- Characterization of engineered biochar by SEM, TEM, EDX, FT-IR and XRD reveals the formation of engineered biochar and also its elemental composition and functional groups.
- Maximum adsorption was achieved almost at every pH range (2-10) for Acetaminophen using Mg/Al engineered biochar pyrolyzed at 700°C.
- Sorption kinetics showed better fitting by pseudo-second order kinetic model.
- Almost 100% removal was achieved for acetaminophen (10 mg/L) with an equilibrium time of 10 h at 25°C.
- Engineered biochar prepared at 700°C have shown greater removal than engineered biochar prepared at 500°C