

Dr. Chin-Min Cheng, Senior Research Associate, and Dr. Linda Weavers, Professor, in the Department of Civil, Environmental and Geodetic Engineering at the Ohio State University are working on an Ohio Water Resources Center funded project via an OWDA subaward. Their project titled **“Separation of Phosphorus- and Nitrogen-nutrients from Agricultural Degraded Waters Using Pervious Filter Material Developed from Industrial By-products”** aims to evaluate usage of industrial waste materials for nutrient filtration. These developed filter materials would be a low cost alternative for separation of nutrients from agricultural drainage waters. Furthermore these filters might be potentially recycled and reused as soil amendments or fertilizers (Figure 1).

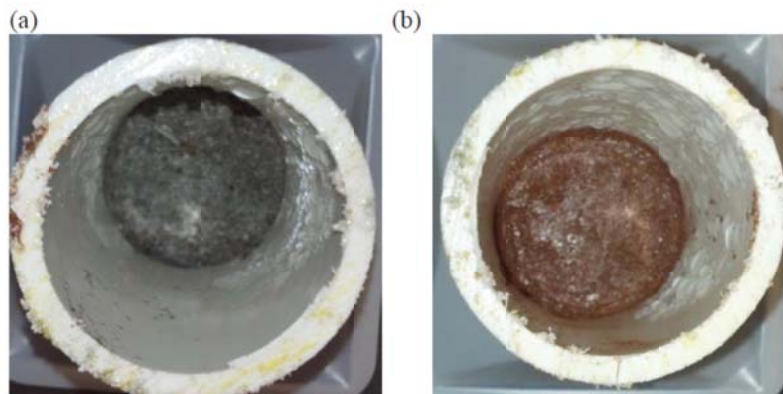


**Figure 1** Previous Filter Material

In this project, two types of pervious filter materials to remove nutrients, i.e., nitrate and phosphate, from agriculture drainage waters (ADW) are being developed and characterized (Figure 2). The P-type filter material contains fly ash, sulfite-rich flue gas desulfurization (FGD) material and quick lime to selectively bind phosphorus. The nitrogen capture materials (N-type filter) are prepared from red mud, fly ash, and stabilized FGD material. The cured filter materials were tested for their chemical (i.e., elemental and mineral compositions), physical (density and surface morphology), and engineering (i.e., permeability (k) and/or hydraulic conductivity (K)) properties and the testing of their

nutrient sorption capabilities is starting.

We observed 95% removal of phosphate from synthesized agriculture drainage waters using one of the developed P-type filters. Furthermore, adsorption of nitrogen nutrients appears to occur using the N-type filter. The effectiveness and applicability of using the industrial waste-derived filter material to separate and recover nitrogen- and phosphorus-nutrients from ADW will be evaluated in more detail over the remainder of the project period.



**Figure 2** Prepared pervious filter materials; (a) P-type and (b) N-type

Researcher: Dr. Chin-Min Cheng’s work is to seek approaches to better manage by-products produced from industrial processes and agricultural operations, which consequently improves the sustainability of our society by reducing the consumption of natural resources and associated environmental impacts.