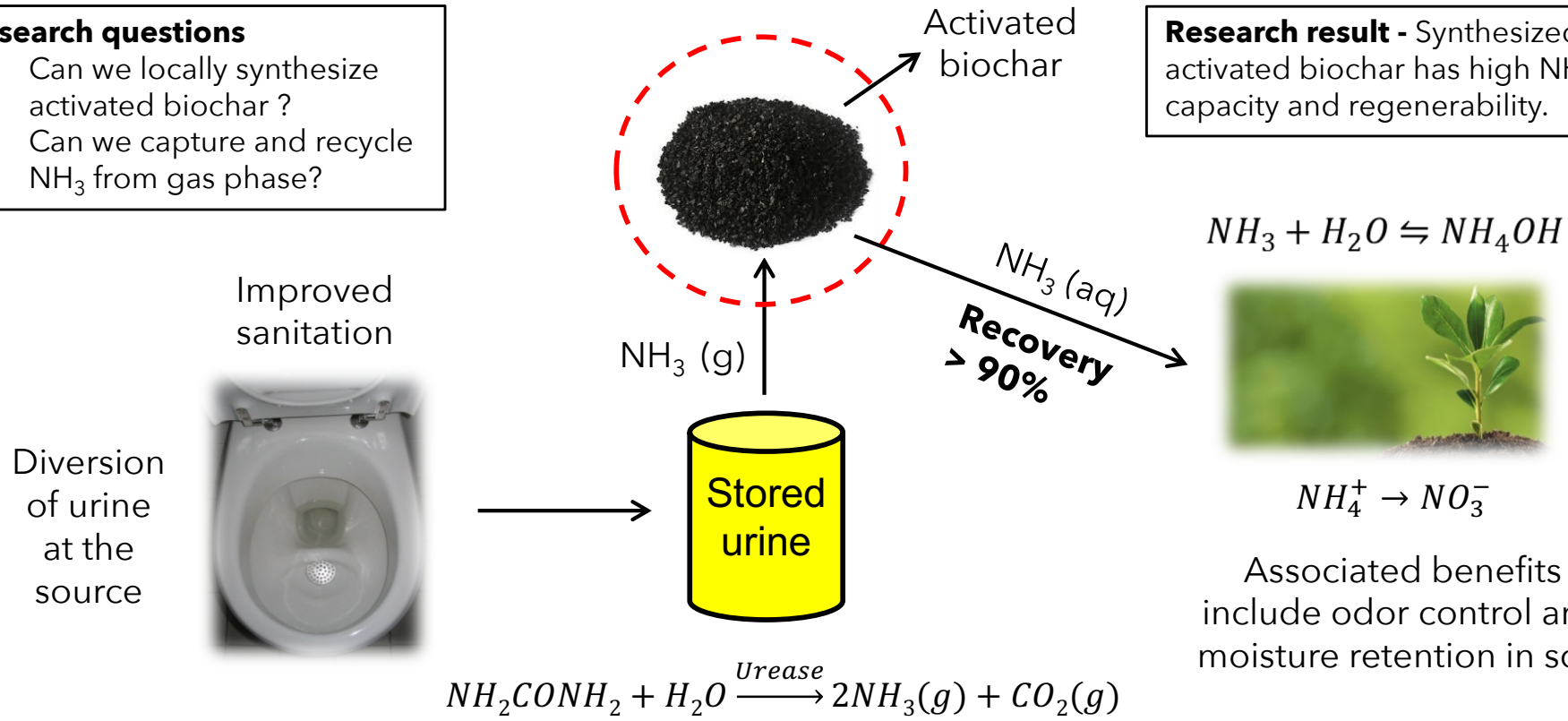
Recovery of NH_3 off-gassed from urine

Mohit Nahata

Research questions

1. Can we locally synthesize activated biochar ?
2. Can we capture and recycle NH_3 from gas phase?

Research result - Synthesized activated biochar has high NH_3 capacity and regenerability.



$$NH_2CONH_2 + H_2O \xrightarrow{Urease} 2NH_3(g) + CO_2(g)$$

As efforts to provide sanitation services in low resource rural settings of the world proliferate, nutrient recovery via source separation of urine and redeployment as a fertilizer is an important option in regions with challenging socio-economic constraints. Substantial N is lost via off-gassed ammonia that can be captured by locally-synthesized sorbents such as biochar and used as a soil supplement to both return N to fertilizer-limited soils and enhance soil moisture. We synthesized activated biochar from cellulose as a model biomass and prosopis wood, which is native to Ethiopia in simple batch setups. Most of the ammonia is physisorbed and readily desorbed in water. This suggests that using ammonium-sorbed activated biochar will produce a soil supplement with bioavailable N that also supports soil moisture retention.