

Chat

Aurea Heusser: Question for Weonjung: in your graphs you showed rates but with the axes in mg/L, was it per hour oder per day? And one of your conclusion is the increased TOC removal but is that limiting at all for the HRT or the process? In our system the nitrifiers were always the limiting ones, that is why I am wondering.

Weonjung Sohn, UTS: To Aurea: It's mg/L concentration per measured per day and rates were in % in the y axe. TOC removal increase had no inhibition on the nitrification rate and HRT in my study. Thanks.

Rebecca Nelson: Might the activated carbon contribute to housing the nitrifying bacteria?

Weonjung Sohn, UTS: To Rebecca: Actually there are some studies that PAC also contributed to housing the nitrifying bacteria, so I am currently planning the analysis on the microbial community as well.

Arthur Davis: To Dr. Popat: how does the system produce power?

Sudeep Popat: @Arthur - with Magnesium the thermodynamics change that it is actually a fuel cell not an electrolysis cell!

Arthur Davis: Also, is this a technology that will be available at some point?

Aurea Heusser: To Sudeep: Very nice findings! In the big buildings we often had hydrolyzation of urea happening already in the pipes.

Could that be a problem for the presented system in big applications?

Sudeep Popat: @Aurea - great question. So I think it depends on where this system would be located, and how it is incorporated.

Rich Earth Institute: Sudeep: how much H₂O₂ was used per liter urine, and how many watt-hours?

Sudeep Popat: @REI - our non-electrochemical H₂O₂ experiments were done with 1000 mg/L. But as I showed later, we seem to get stabilization even with ~100-200 mg/L that is produced electrochemically.

Anna kogler: @Sudeep - do you have plans to quantify disinfection byproduct formation? For electrochemical stripping, I also observe low chlorine concentrations but as I presented there is substantial DBP formation, so I'd be curious to see if that might be case in your system as well.

Sudeep Popat: @Anna - thanks for the question. Yes! We're planning to measure DBPs. Which anode materials do you use? We've noticed that carbon anodes give us a lot of chlorine (usually an order of magnitude higher).

Anna kogler: @Sudeep - great to hear! We use titanium mesh electrodes coated with Ta₂O₅/IrO₂ mixed metal oxide

Sudeep Popat: @Anna - thanks. Good to know. We have also done some electrochemical ammonia stripping work, where we used different membrane configurations to avoid Cl₂ production, but it's good to know there are anodes that lead to low Cl₂ concentrations.

Sudeep Popat: Thanks, everyone. I'm going to miss the breakout session, but if there are any questions related to our work on

electrochemical urine stabilization, feel free to email me:
spopat@clemson.edu.

Abigail Cohen: Was this volume scale up selected to fit the needs of the dorm application? or based on the engineering/economic constraints of the system?

Kindle Williams (she/her) | Stanford University: @Abigail - thanks for the question! The 3000x volume factor increase is based on achieving 90% recovery of the incoming ammonia nitrogen (TAN) from the wastewater stream, given our current lab-scale performance / recirculation rates. It's likely with our ideas on reactor design, the actual volume scale-up will be a little less drastic because we'll likely get somewhat better performance. Does that answer your question?

Abigail Cohen: @kindle yes! thank you.

utsav shashvatt: @Caitlin: can you give a sense of the pressure and duration of the operation?

Caitlin Courtney: @Utsav, thanks so we operated the NF step at 35 bar and the RO step was run at 55 bar. Time isn't really a great indicator since we used a lab-scale membrane that was 14 cm² but in terms of flux with the loose NF membrane the flux was approx. 200 L/m²/hr, for the tight NF membrane it was 80 L/m²/hr, and for the RO it was 60 L/m²/hr.

utsav shashvatt: @Caitlin: Great, thanks for the details!

utsav shashvatt: @Caitlin: But, I am guessing the flux decreases over time if you maintain the same pressure?

Caitlin Courtney: Yes, because we used a closed loop system the flux did decrease as the brine became more concentrated.

Hilda Maingay: Woodchips are not advised to be used in composting toilets

Greg Caporaso: @Hilda, Jeff may have something to add here, but for this first project we were enrolling individuals who were already using composting toilet systems and we wanted to collect material based on what they were already doing to understand similarities and differences in microbial succession across systems. We therefore have a variety of bulking materials that were used across the buckets.

Hilda Maingay: Jeff, using hardwood shavings is advised over wood chips in composting toilets. Would speed up composting process

Jeff Meilander - NAU: Thanks @Hilda. We asked all subjects to use their composting toilets as they had rather than change anything. In future studies I would like to standardize the process for composting toilet users.

Carsten Beneker (him/he) | KWB: Jeff, interesting. But I do not get how you are composting (Aerobic) in closed buckets? Could you share Information on the composting Methods that you are applying?

Jeff Meilander - NAU: @Carsten....each bucket has a 2" PVC pipe with 1/2" holes drilled through the PVC. This passes through the center of the bucket and allows air to flow through passively. It is mostly a closed system and you can see that the compost moisture has not changed significantly over time, but we also roll the bucket on all three axes 20 times every week. Let me know if that answers your question.