## Supplementary Materials

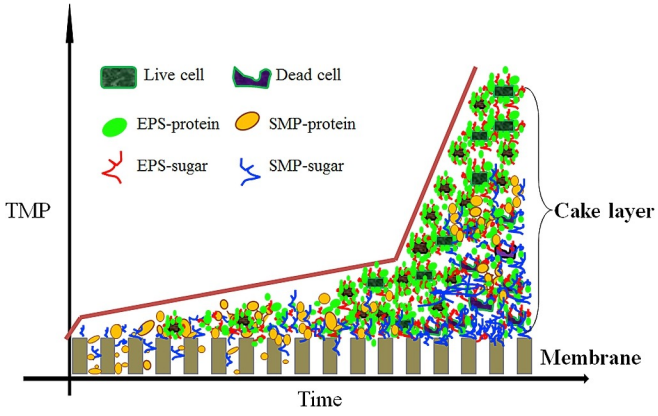


**Fig. S1.** Changes in the spatial and temporal distributions of biopolymer compounds, and live/dead cells in the membrane cake layer in the TMP development process [1].

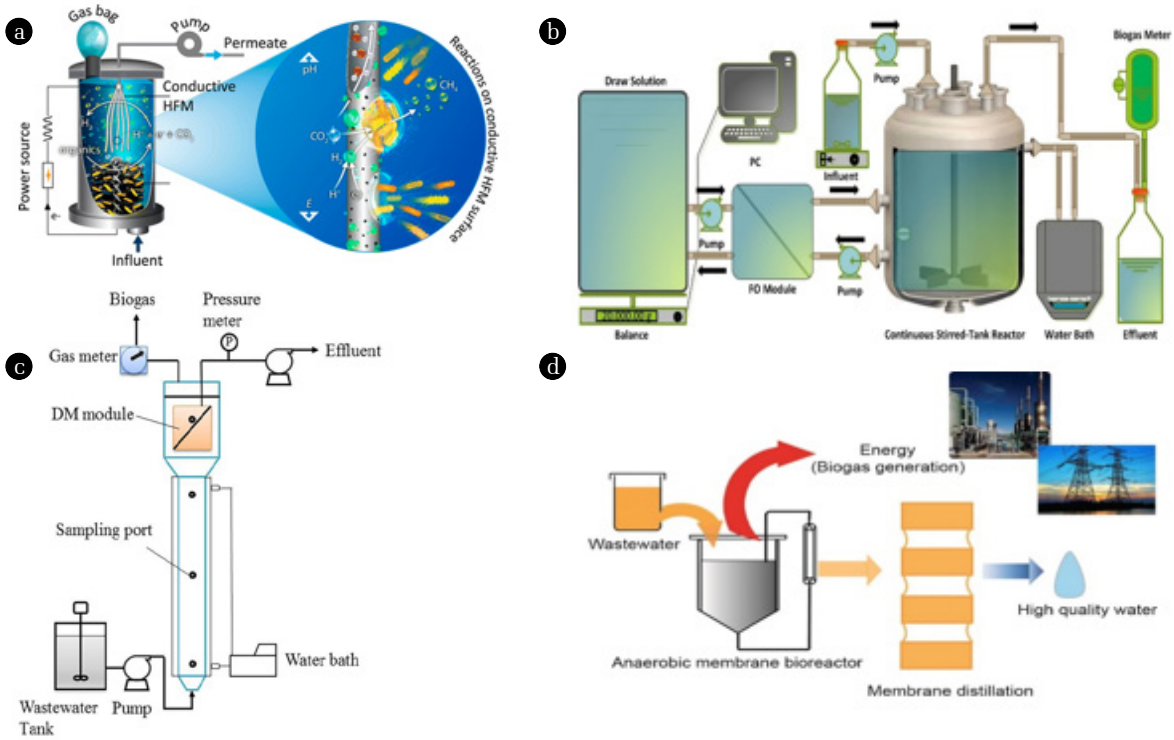


**Fig. S2.** (a) Anaerobic electrochemical membrane bioreactor [2], (b) anaerobic dynamic membrane bioreactor [3], (c) anaerobic osmotic membrane bioreactor [4], and (d) anaerobic membrane distillation bioreactor [5].

**Table S1.** Comparison of Conventional Aerobic Treatment, Anaerobic Treatment, Aerobic MBR and AnMBR [6]

| Feature | Conventional aerobic treatment | Conventional anaerobic treatment | AeMBR | AnMBR |
|---|---|---|---|---|
| Organic removal efficiency | High | High | High | High |
| Effluent quality | High | Moderate to poor | Excellent | High |
| Sludge production | High | Low | High to moderate | Low |
| Footprint | High | High to moderate | Low | Low |
| Biomass retention | Low to moderate | Low | Total | Total |
| Nutrient requirement | High | Low | High | Low |
| Energy requirement | High | Low | High | Low |
| Start up time | 2–4 weeks | 2–4 months | < 1 week | < 2 weeks |
| Bioenergy recovery | No | Yes | No | Yes |

## References


1. Meng F, Zhang S, Oh Y, Zhou Z, Shin HS, Chae SR. Fouling in membrane bioreactors: an updated review. *Water Res.* 2017;114:151–180. https://doi.org/10.1016/j.watres.2017.02.006.
2. Katuri KP, Werner CM, Jimenez-sandoval RJ, et al. A novel anaerobic electrochemical membrane bioreactor (AnEMBR) with conductive hollow- fiber membrane for treatment of low- organic strength solutions. *Environ. Sci. Technol.* 2014;48:12833–12841. http://dx.doi.org/10.1021/es504392n.
3. Yang Y, Zang Y, Hu YS, Wang XCC, Ngo HH. Up flow anaerobic dynamic membrane bioreactor (AnDMBR) for wastewater treatment at room temperature and short HRTs: Process characteristics and practical applicability. *Chem. Eng. J.* 2020;383:123186. https://doi.org/10.1016/j.cej.2019.123186.
4. Schneider C, Evangelio Oñoro A, Hélix-Nielsen C, Fotidis IA. Forward-osmosis anaerobic-membrane bioreactors for brewery wastewater remediation. *Sep. Purif. Technol.* 2021;257:117786. https://doi.org/10.1016/j.seppur.2020.117786.
5. Song XY, Luo WH, McDonald J, et al. An anaerobic membrane bioreactor – membrane distillation hybrid system for energy recovery and water reuse: Removal performance of organic carbon, nutrients, and trace organic contaminants. *Sci. Total Environ.* 2018;628:358–365. https://doi.org/10.1016/j.scitotenv.2018.02.057.
6. Lin HJ, Peng W, Zhang MJ, Chen JR, Hong HC, Zhang Y. A review on anaerobic membrane bioreactors: Applications, membrane fouling and future perspectives. *Desalination* 2013;314:169–188. https://doi.org/10.1016/j.desal.2013.01.019.