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Monday, Sept. 11
8:30 AM – 10:00 AM
SESSION 5: Water Treatment - Contaminants/Drugs

The Removal and Breakdown of Chemotherapy Drugs Derived from Hospital Wastewater Using Based Ozone AOP Technology- a Pilot Scale Project at Tel-HaShomer Hospital, Israel - Dror Avisar, Tel Aviv University, Tel Aviv, Israel (co-authors: H. Mamane, H. Chikurel)

Upstream treatment of hospital wastewater is a relatively new approach that until now has been examined in a limited number of studies. The research findings point on a high potential of the approach in elimination of organic micro/nano-pollutants (OM/NPs) already within the hospital premises. The main bottleneck however is the current stage of optimization of existing treatment technologies for a combined cost-efficient elimination of OMPs. Previous studies explored the potential of biological treatment that was significantly lower than requested treatment goals. Some new studies proposed complementary treatments after bio-treatment including MBR based on either active carbon or ozone based Advanced Oxidation Processes (AOP). This pilot-study proposes, for a first time, a hybrid biological physical treatment based on a combination of membrane bioreactor (MBR) and AOP that is part of the bio-treatment and does not come as a complementary treatment. Pilot experiments were performed at Tel HaShomer hospital including patented modifications of AOP to achieve a maximal retention of OM/NP combined with a precise pore size modification of MBR membranes.

Application of Nanostructured Solar Photocatalytic Membrane Reactors (PMRs) for Water Treatment - Hadas Mamane, Tel Aviv University, Tel Aviv, Israel (co-authors: I. Horovitza, L. Lozzic, D. Avisar)

Microfiltration (MF, with pores in the 0.1-10 μm range) systems offer quick and selective separation of suspended particles, larger pathogenic micro-organisms while operating at low transmembrane pressure. However, a number of contaminants, including micro-pollutants and viruses, can only be poorly removed from water by MF alone. The use of semiconductors in combination with sunlight irradiation (i.e. photocatalysis) for the treatment of water and wastewater is classified as a heterogeneous advanced oxidation process (AOP). A hybrid photoreactor system combining both membrane filtration and photocatalysis can address multiple functions besides traditional physical separation as degradation of organic pollutants, inactivation of microorganisms and self-antibiofouling action. In the thin-film photocatalytic membrane reactor (PMR) hybrid configuration, the catalyst is embedded, and thus immobilized, in a membrane matrix and activated by direct illumination of the membrane. A highly efficient UV-vis-active N-doped TiO2-coated MF Al2O3 membrane based PMR was recently published by our research group. The photocatalytic activity of the PMR was determined by the degradation of the model micropollutant carbamazepine and using a solar simulator as the light source. It was found that membrane permeation provided a more effective contact between the reactants and the photocatalytically active sites by introducing, in addition to diffusion, forced transport of reactants by convection inside the pore channels owing to membrane high tortuosity. Disinfection of virus particles by PMR may prove to be challenging as the surface-particle interaction is crucial to process

efficiency, due to the complex interactions between virus particles and PMR. Removal of MS2 bacteriophage, a surrogate for pathogenic waterborne viruses, by the PMR will be presented as a study case for disinfection efficiency. Virus removal in different water qualities will be addressed and correlated to the physico-chemical properties of the virus and the membrane.

Removal of Micro-pollutants from Wastewater RO Concentrate Using AOP - **Aviv Kaplan,** The Hydrochemistry Research Group, Water Research Center, Tel Aviv University, Tel Aviv, Israel

Wastewater reuse after reverse osmosis might be an ideal solution for water shortage around the globe. The bottle neck that preventing application on large scales is the concentrate. This concentrate, reach in organic micro pollutants, nutrients and metals, requires a special treatment in order to avoid environmental damage to water bodies. Applying advanced oxidation processes (AOP) on this concentrate seems to have a great potential to degrade micro pollutants and other organic matter, transferring the concentrate to be much less eco-toxic and readily available for further purification treatments.