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Nanoparticle Functionalization of Commercial Filtration Membranes for Water Purification[1] SEAN MCBRIDE, Marshall University — This work highlights how monolayer thick, self-assembled nanoparticle membranes, made from 5 nanometer diameter gold nanoparticles encapsulated with an organic thiol molecule, can be transferred to commercially available filtration membranes to enhance the rejection of charged molecular dyes from water to nearly 100 percent rejection at a concentration of 145 micromolar. Molecular dyes are a serious contributor to waste water pollution in the textile industry. Most molecular dyes are made up of a negatively charged dye molecule and positive sodium ions that dissociate in aqueous solution, allowing for easy rejection measurements of both species. The negative dye molecule concentration in the feed and permeate can be measured using ultraviolet-visible spectroscopy, while the positive ions can be measured via ion specific conductivity measurements. Rejection measurements for the negative dye molecules will be presented for molecular dyes that vary systematically in ionic charge. With only 2.5 percent of all water on Earth being fresh water and with only 0.3 percent being accessible on the surface of the Earth, having access to fresh water is not only a problem of national significance, but one of global significance.

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