

## An Enterobacter Aerogenes Immobilized Novel Composite Membranes for the Production of Hydrogen Gas

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A novel membrane with multi layer structure has been prepared to obtain highly purified hydrogen gas from organic waste. The top layer is thin dense film of polydimethylsiloxane (PDMS) and chitosan (CS) and the support layer is composed of microporous polyethersulfone (PES). The combination of PDMS, CS, and PES has been operated to prepare the membrane to gain high performance of H<sub>2</sub> gas: PDMS/PES, PDMS/CS and PDMS/CS/PES composite membranes were prepared. Enterobacter aerogenes, a fermentative microbial, was immobilized on the porous layer of the membranes by immersing membrane modules on the culture and applied to the dark fermentation reactor for hydrogen production. The membranes were characterized by scanning electron microscopy (SEM) and gas permeation analysis (GPA). H<sub>2</sub> diffusion coefficient was constant as a value, 7.82407 [X10<sup>5</sup> (cm<sup>2</sup>/s)]. The yield of H<sub>2</sub> produced was examined by gas chromatograph (GPC). It was most at the case of PDMS/CS/PES composite membrane and the maximum H<sub>2</sub> concentration (%) value was up to 67.55 %.