

・研究課題名 = 「A novel leachate treatment system to reduce landfill greenhouse gas emissions by biological denitrification with methane by a novel bioreactor with microbubble generation by an ultrasonic oscillating porous board」

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・要旨 (200語以内) = We developed a novel denitrifying reactor for landfill leachate to reduce the emissions of landfill methane. Landfill methane is supplied into the reactor as an electron donor for methane-denitrifying microorganisms. Thus, this cost-effective environmental technology reduces the greenhouse gas emissions from landfill and treats leachate without adding external carbon sources. This project focused on a method development of cultivation technology for methane-denitrifying microorganisms and a system development of a methane supplying technology into the reactor with microbubble generation by an ultrasonic oscillating porous board. Methane oxidation rate and denitification rate of the reactor were 0.2 mmol/L/day and 0.04 mmol/L/day, respectively. Nitrite did not activate but inhibit the reactions. The developed reactor with microbubble generation by an ultrasonic oscillating porous board stably generated microbubbles of approx. 50  $\mu\text{m}$  diameters. Oxygen transfer efficiency ( $E_A$ ) of the reactor was 24-41% with 1-3 ml/min air flow rates. Thus, the microbubbles generator with pump was scaled down to the hand size. Then, the reactor was operated with methane gas instead of air. The reactor was kept anoxic with methane gas which was supplied into the reactor continuously. Growth of microorganisms attached on the reactor surface was immediately observed after the start-up the reactor with methane.

・キーワード (5語以内) = Reduce greenhouse gas emissions, Denitrification with methane, Microbubble, Ultrasonic Oscillating Porous Board