

論文内容の要旨  
Abstract of Dissertation

氏名 Name KWEDI NSAH LOUIS-MARLY

Since rapid industrialization in recent decade has caused serious environmental problems, releasing solid waste (contaminated soil) as well as liquid waste (wastewater) to the surrounding is restricted in sustainable issue. However, industrial wastewater which is a by-product of industries is still released by most companies on a daily base. Therefore, the objective of this study is to demonstrate the possibility of utilizing ultrasound (US) technology for waste treatment and consequent recycling. During waste treatment or waste recycling, the addition of other material is usually considered in most instances. From the standpoint of waste utilization, however, the addition of stabilizers or other chemicals influences efficiency and reliable treatment. Therefore, chemical stabilization by using additives is considered essential. However, for human safety, the environmental reuse of such material may have an adverse effect to humans, animals and the environment in general.

US technology having high output power was applied for waste chemical decomposition like diaminobenzidine (DAB) and soil washing treatment for geopolymer fabrication. In the present thesis, I studied following contents relating with US technology used as new environmental methods in chemical organic pollutant, metal polluted soil and nitrogen fixing for US water treatment. For the chemical decomposition, nitrate and nitrite ions were formed under US and converted DAB to a triazine molecule. Thus, the formation of nitrate and nitrite was studied under high power ultrasound. In addition, the presence of ammonia was efficient for soil washing with high-power US at 28 kHz for de-carbonized soil, meaning that the US showed effective removal of carbon contents from the soil. Then, the washed soil was used for fabrication to geopolymer ceramic matrix.