

DESCRIPTION FOR THE GENERAL PUBLICS

There is a need to improve wastewater treatment technologies and methods for recovering materials from the waste produced during wastewater treatment. One of the technologies being developed uses aerobic granular sludge. In this technology, the biomass forms spherical consortia of microorganisms, i.e. granules (see photo). The spherical structure of the granules allows the simultaneous removal of carbon, nitrogen and phosphorus in a single reactor. This structure contains large amounts of extracellular polymers, and phosphorus compounds are accumulated in the microbial cells. Granular biomass has very good settling properties. There is no need for wastewater recirculation in granular sludge systems, and these systems require 20% less space than a conventional sewage treatment plant. Energy consumption in aerobic granular systems is estimated to be about 50% lower than the average energy consumption of an activated sludge system of similar size.

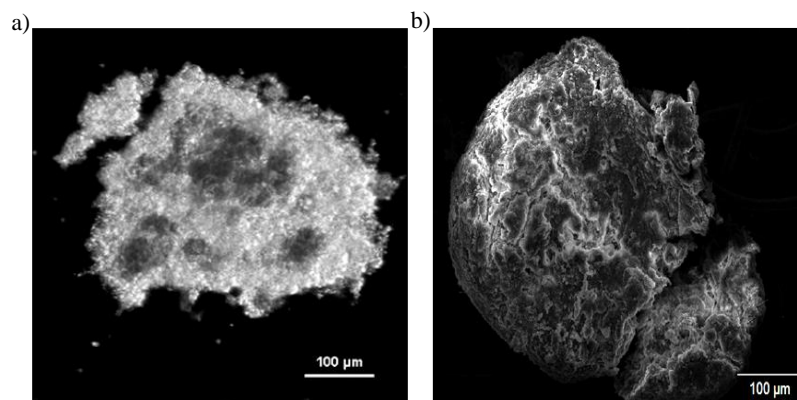


Fig. 1 The morphology of aerobic granule; a) a photo taken with optical microscope and b) scanning electron microscope

The technology of aerobic granules has mainly been tested at laboratory scale. This project will produce comprehensive knowledge about the morphological, microbiological and physico-chemical properties of aerobic granules in full-scale systems. The main mechanisms of pollutant removal from wastewater by aerobic granules will be defined. The excess granular sludge that is generated during wastewater treatment will be used as a source of phosphorus and polysaccharides. Phosphorus is a valuable fertilizing agent and polysaccharides will be used to remove heavy metals. To obtain energy in the form of biogas and fertilizing materials, the conditions for stabilization of excessive granular sludge in methane fermentation and composting will be optimized. Groups of bacteria and fungi will be identified that are involved in composting of excess granular sludge, and the kinetics of the synthesis of humus compounds will be evaluated.