Dr. Sailesh N. Behera, Assistant Professor, Department of Civil Engineering receives **Early Career Research Award (Individual centric) from Science and Engineering Board (SERB), Department of Science and Technology (DST), Government of India. He has been awarded the grant of ₹ 48 Lakh for duration of three years (2017-2020) with a research project** titled as: "Physicochemical characterization, formation mechanism and human health risk assessment of size-fractionated particulate matter emitted from stationary diesel engine exhausts through an experimental set-up of environmental chamber".

Summary of the Projects

The short-term acute and long-term chronic exposures to several toxic chemicals including trace elements, ions, carbons, inorganics and organics present in airborne particulate matter (PM) or aerosols emitted from exhausts of non-road stationary diesel engines cause adverse human health effects, such as cancer and many other respiratory diseases. The ultrafine particles (aerodynamic diameter (AED) ≤ 100 nm) and fine particles (AED ≤ 2.5 µm) generated from these stationary diesel engines have significant contributions to total diesel particulate matter (DPM) emissions in both developed and developing countries. To find technological solutions for mitigation of pollution from such significant air polluting sources, it is necessary to examine the cause-effect relationship between constituents of these particles and atmospheric mechanisms those facilitate formation of secondary particles. Although, several studies in the past have examined the microstructural behavior of the particles emitted from stationary engine exhausts, there still remain many research gaps to address formation mechanisms of secondary particles under real atmospheric conditions.

This research project has been planned for a thorough investigation into physicochemical characterization and formation mechanisms of size-fractionated PM at ten different sizes, ranging from 56 nm to 18 µm emitted from exhausts of a stationary diesel engine through a controlled experimental set-up of environmental chamber at laboratory scale, where a conducive situation is prevailed for atmospheric reactions to take place. The chemical constituents of PM consist of eight inorganic ions, twenty four trace elements and eight fractions of organic and elemental carbons. The formation of secondary organic and inorganic PM will be examined under different engine load conditions. The interrelationship between predicted PM acidity, meteorological conditions and secondary PM formation at different size ranges will be studied. The human health risk assessment will be conducted for cancer and non-cancer effects because of exposure to toxic elements in ultrafine and fine particles. The depositions of particles at different regions of human respiratory system (head, tracheobronchial and pulmonary) will also be predicted.

For more information please visit:
http://snu.edu.in/engineering/sailesh_n_behera_profile.aspx