Catalytic combustion system for ultra-lean methane from mine ventilation air

Supervisor: Dr Philip Kwong in collaboration with local and overseas researchers.
Nature of work: Material characterization, catalytic combustion and ozone chemistry
Area: Combustion and Nanoporous materials.
Potential implications: Development of methane mitigation system for coal mine ventilation air.
Funding: *Via* the various University scholarship schemes (see separate information for these).

Brief description: The development of low-cost technology to mitigate the methane content in coal mine ventilation air remains a challenge. All commercially viable technologies would benefit from the inclusion of a low range combustion system for ultra-lean methane (0.02-1vol%) mitigation, which could improve performance and lower operating costs by as much as 30%. To this end, we will develop a suite of novel ozone catalytic oxidation system and give superior performance for the combustion of ultra-lean methane in air mixtures at low temperature. We will use combinatorial chemistry to ensure optimum catalyst formulation for ozone oxidation reactions, and then evaluate the optimized materials in a porous burner system. This will enable the comparative improvement in performance, especially in ultra lean methane condition, resulting from the incorporation of the catalysts to be determined directly. The results of the study will be of relevance to the development of ultra-lean methane mitigation systems that extending concentration limits and lowering the reaction temperature of the state-of-the-art combustion system. The successful completion of the study will result in a reduction in the capital and operating costs of combustion-based mine ventilation air mitigation technologies.