WATERWORKS 2017 RDI FUNDED PROJECTS BOOKLET
Project: Sense and Purify- Detect, Destroy and Remove Water Contaminants
Acronym: Spy
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Project structure (WPs description):
WORK PACKAGE 1: Sensors For Wastewater. We will develop sensors that address gaps in existing technology so as to create an integrated, closed loop sense and purify system. In this way, the water inlet flow can be dynamically controlled to maximise wastewater throughput while minimising both the pollutant concentration in the outflow and the overall energy consumption.
WORK PACKAGE 2: Diamond Particles For Wastewater Treatment. The SPy technology uses an electric field to induce a potential in individual BDD particles so that they can produce hydroxyl radicals to mineralise contaminants, e.g., pharmaceuticals, to carbon dioxide. It is important to note that there is no electrical connection to the BDD particles, i.e., the mineralisation is wirelessly driven through the electric field. This work package will optimise the composition and size of the conducting diamond particles to maximise the rate of hydroxyl radical production. WP2 will: i) Develop a computational model that will inform the selection of conducting diamond particles. ii) Experimentally characterise and optimise the particles as well as using fast scan methods and GC product analysis to elucidate the destruction mechanism.
WORK PACKAGE 3: Integrated Reactor. The major objective of SPy is to create a technology that can mineralise/incinerate organic pollutants and demonstrate its utility for the clean-up of food, pharma and municipal wastewater streams. WP 3 will design flow through reactors so as to optimise the destruction of organic pollutants. We will identify the optimum electrode geometries (number, size, position, structure) to create sufficiently intense electric fields so that the potential of the BDD particles within the reactor leads to hydroxyl generation.

WORK PACKAGE 4 Real World Wastewater Testing. We will undertake real world testing of the performance of the SPy reactor using food production and pharmaceutical wastewater streams. These streams have been carefully selected to have different properties from the treatment perspective including a wide range of total organic loads, different loads of pathogens, suspended solids and compounds with a wide range of oxidation potentials. Also, the samples present different analytical challenges (concentration, number of analytes, dynamic ranges etc.) for the integrated sensing system.
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