

Treatment of wastewater from offshore oil and gas industry by using nanotechnologies

F. Gao¹, H. Zhang², Z. Asam¹, L. Xiao¹,

¹ Department of Civil, Structural and Environmental Engineering, Trinity College Dublin, Dublin 2

² CRANN, Naughton Institute, Trinity College Dublin, Dublin 2

Contact detail: Prof. Liwen Xiao (Liwen.xiao@tcd.ie; +353 1 896 3741)/ Prof. Hongzhou Zhang (Hongzhou.zhang@tcd.ie; +353 1 896 4655)

INTRODUCTION

Water treatment is quickly emerging as one of the most significant challenges facing the offshore oil/gas industry. Nanomaterial, with relative large surface areas and extremely high surface reactivity, could be an inexpensive and effective solution to treat PW and facilitate the achievement of “a zero environmental harmful discharge” goal in oil/gas industries.

Two-dimensional (2D) nanostructures with a large lateral size and a small thickness construct an important cornerstone for modern materials science. Nanomaterials are typically defined as materials smaller than 100 nm in at least one dimension. At this scale, materials often possess novel size-dependent properties different from their large counterparts. Nanotechnology offer leapfrogging opportunities to develop next-generation water supply systems. 4 classes when it

treatment applications, which are dendrimers, metal-containing nanoparticles, zeolites and carbonaceous nanomaterials. The overall objective of this project is to study the feasibility of using nanomaterials to treat PW from offshore oil and gas industry.

MATERIALS, METHODS AND PRELIMINARY RESULTS

Potential nanomaterials - The porous boron nitride (BN) nanosheets and Nano-zeolite – have been chosen for the project based on the following: (1) have high sorption capacity of heavy metals, oil and other organic matters; (2) can be easily collected from water after wastewater treatment; and (3) can be easily cleaned for re-used. The removal efficiencies and the impact of parameters such as pH and temperatures on the efficiencies are being assessed. Nanomaterials re-use after treatment will also be investigated.

comes to water NH₄-N and PO₄-P removal by using nanomaterial nano-zeolites.

A total of 20 treatments are used to improve the nanomaterial nano zeolites' performance

