Low-cost polymer-based sensor for the detection of oil leaks

Connor Palin and Erica Pensini

School of Engineering, University of Guelph, Guelph, Canada

Written for presentation at the CSBE/SCGAB 2018 Annual Conference
University of Guelph, Guelph, ON
22-25 July 2018

ABSTRACT Increasing demand for oil in the past 50 years has caused thousands of kilometers of pipeline to be constructed in Canada. While the number of pipeline leaks is decreasing (according to the Transportation Safety Board), every year there is still over a million cubic meters of leakage. While there are many different leak detection devices available, they can be very expensive and complicated to implement. This project aims to develop a simple and low-cost sensor to detect the presence of oil leaks.

In the past decade, conductive polymers have started to become cheaper and easier to synthesize. This innovation has given rise to several new types of chemical sensors. These sensors take advantage of the change in the polymer’s electrical properties when exposed to its associated chemical.

Using commonly available polymers and a variety of doping agents, a material is being designed to detect the presence of chemicals commonly found in oil. Each material is synthesized and tested for its various electrical properties. It is then doped with materials such as charcoal to increase its conductivity. After each material reaches an acceptable conductivity level it is exposed to various chemicals while measuring the change in its electrical properties.