Characterization of Industrial Coolant Fluids and Continuous Ageing Monitoring by Wireless Node-Enabled Fiber Optic Sensors - DTU Orbit (09/12/2018)

**Characterization of Industrial Coolant Fluids and Continuous Ageing Monitoring by Wireless Node-Enabled Fiber Optic Sensors**

Environmentally robust chemical sensors for monitoring industrial processes or infrastructures are lately becoming important devices in industry. Low complexity and wireless enabled characteristics can offer the required flexibility for sensor deployment in adaptable sensing networks for continuous monitoring and management of industrial assets. Here are presented the design, development and operation of a class of low cost photonic sensors for monitoring the ageing process and the operational characteristics of coolant fluids used in an industrial heavy machinery infrastructure. The chemical, physical and spectroscopic characteristics of specific industrial-grade coolant fluids were analyzed along their entire life cycle range, and proper parameters for their efficient monitoring were identified. Based on multimode polymer or silica optical fibers, wide range (3-11) pH sensors were developed by employing sol-gel derived pH sensitive coatings. The performances of the developed sensors were characterized and compared, towards their coolants' ageing monitoring capability, proving their efficiency in such a demanding application scenario and harsh industrial environment. The operating characteristics of this type of sensors allowed their integration in an autonomous wireless sensing node, thus enabling the future use of the demonstrated platform in wireless sensor networks for a variety of industrial and environmental monitoring applications.

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