

Diagnosis of bacteria for diabetic foot infection using electronic nose technology

Abstract

Foot infections may lead to serious complications if failed to detect at an early stage; especially for diabetic patients. It is necessary to develop an easy and reliable method to identify and classify the causative bacteria from the wound to assist health care practitioners. Therefore, this study proposed an alternative to the conventional technique by using an electronic nose with 32 matrices of non-specific conducting polymer sensors known as Cyranose320. A novel odour detection method is developed and targeted for microbial bacteria causing infection on diabetic foot using direct injection of static headspace. The bacteria are obtained from the clinical specimens by swabbing technique and isolated in a blood agar medium to verify the performance of the bacterial specialized medium. Various classification algorithm techniques proved that each bacteria produce certain characteristic of odour and can be used as a surrogate bio-marker. Thus, preliminary results from this study show that the electronic nose is able to identify and classify the presence of causative bacteria with high success rate of over 90% in diabetic foot infection.

Keywords — Cyranose320, diabetic foot infection, electronic nose, pattern recognition.