

ABSTRACT**System and computer-implemented method for determining predicted component concentrations of a target mixture**

A system 300 for determining predicted component concentrations of a target mixture is described in an embodiment. The system 300 comprises a mid-infrared waveguide sensor 302 configured to measure absorption spectra and a computer 304. The computer 304 comprises a processor 402 and a data storage 414 storing computer program instructions operable to cause the processor to: (i) receive first training absorption spectra for a plurality of training mixtures from the mid-infrared waveguide sensor 402, the plurality of training mixtures each having one or more components associated with the target mixture and comprises different predetermined component concentrations; (ii) train a first machine learning model using the first training absorption spectra to obtain a first trained machine learning model, the first trained machine learning model being adapted to classify an absorption spectrum of a mixture having one or more of the components associated with the target mixture to identify specific component concentrations of the mixture, the identified specific component concentrations being one of the different predetermined component concentrations; (iii) receive, from the mid-infrared waveguide sensor 302, a target absorption spectrum of the target mixture; and (iv) determine the predicted component concentrations of the target mixture by classifying the target absorption spectrum using the first trained machine learning model. A method 500 for determining predicted component concentrations of a target mixture is also described.

[Figure to publish with abstract: Figure 5]