

A millifluidic calorimeter with Infrared camera for the measurement of chemical reaction enthalpy and kinetics from 5 °C to 90 °C

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Abstract

The aim of this work is to present an infrared calorimeter for the measurement of the kinetics and the enthalpy of high exothermic chemical reactions. The main idea is to use a millifluidic chip where the channel acts as a chemical reactor. An infrared camera is used to deduce the heat flux produced by the chemical reaction from the processing of temperature fields. Due to the size of the microchannel a small volume of reagents (mL) is used. As the chemical reagents are injected by syringe pump, continuous experiments are performed with a very good control of the reagents mixing. A specific injected system enables to perform two flow configurations: co-flow and droplets. Thanks to the isoperibolic thermal properties of the chip the heat transfer is simplified. Then the chemical reaction can be easily characterized with a previous specific calibration. Here, the kinetic and the enthalpy of a strong acid base reaction are monitored in co - flow configuration.

KEY WORDS: Calorimeter, Chemical Reaction, Enthalpy, Kinetics, Millifluidics, Temperature field processing

This paper was published in the QIRT Journal 5.2