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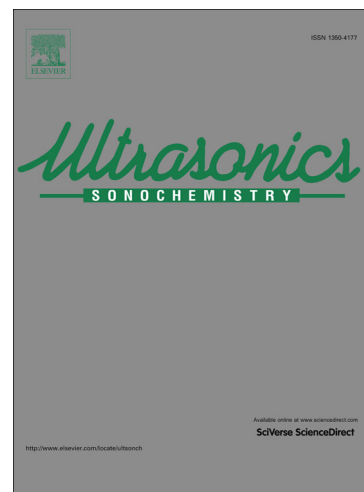
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Droplets Banding Characteristics of Water-in-Oil emulsion under Ultrasonic Standing Waves

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Abstract

Droplets banding is critical to emulsion separation under ultrasonic irradiation as it can greatly improve the separation efficiency. In this paper, the formation process of droplets banding under ultrasonic standing waves was precisely captured by high-speed microscopic photography; by processing the images, the droplets banding characteristics, including the banding formation time and banding interval, were extracted. Then the effects of acoustic intensity, frequency, droplet size, and physical properties of oil and water on the droplets banding characteristics were discussed in details. The results show that the range of acoustic intensities, within which the droplets banding can form, increases with the increase of the frequency; a maximum allowable acoustic intensity exists for banding formation, which also increases with the frequency. The banding formation time, which increases with increasing oil viscosity but decreases with droplet size, is found to be hardly affected by the oil-water interfacial tension. In addition, the banding interval is only related to the frequency, which closely corresponds to the half wavelength.

Keywords: acoustophoresis; ultrasonic standing waves; water-in-oil emulsion; banding formation time; banding interval

1. Introduction

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