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A fractal model of foam

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Introduction

Aim of this presentation is to show the independence of foam structure of sodiumtetradecylsulphate (STS) and polidocanol (POL) on bubble dimensions.

Materials and methods

Images of foam at several concentrations and dilutions are taken for STS and POL foam at different time steps. Digital image analysis is then performed to compute the fractal dimension (FD) and graphs are then outlined to show the time course of FD.
A geometrical model is proposed to explain the structure of foam.
Based on this model, a Montecarlo statistics is then organised to simulate the time evolution of foam. Allowed elementary changes in foam are: new bubbles generation, two or more bubbles merging, bubble subdivision, bubbles collision.
Fixed container walls add new constraints. The model is followed at different times.

Results

The analysis of the fractal dimension show that both materials approach an asyntotic value, which can be related to a specific geometrical model.
Results of the Montecarlo simulations are still in progress.

Discussion

As STS and POL share the same FD, it could be possible to find STS structure in POL at a lower scale. Only a scale factor could then separate STS and POL results.