Bread and pumice

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In order to understand the origin of elongated vesicles in pumice, which is commonly recognized in many pyroclastic deposits, we carried out an experiment using bread as an analog material of magma vesiculation under 1-dimensional deformation field. The experiment consists of 1) the examination of fundamental properties of vesiculation by fermentation of yeast: temporal variation of bread expansion, relationship between the bubble number density and concentration of yeast. 2) the examination of difference of vesicle texture due to expansion style (free expansion vs 1-dimensional expansion). As a result of experiment, we found 1) The 1-D expansion enhance the bubble coalescence. 2) The 1-D expansion generates the characteristic distribution in the space of aspect ratio of bubble vs bubble size. 3) The number density of bubbles decreases with concentration of yeast by the power of -0.2. 4) The expansion rate of bread takes a maximum value corresponding to a specific concentration of yeast. Result 3) and 4) are especially interesting because they are related to the behavior of yeast as life. The result 3) can be explained by assuming that the activity of yeast is a function of concentration of yeast itself. The result 4) suggests that the bubble growth rate is influenced by concentration of yeast. These phenomena suggest that the behavior of yeast as a group is complex and nonlinear.