Necessary (Not Sufficient) Conditions for Droplet behavior

Growth and decay of droplets must occur with different powers

- i.e., how do we design chemistry in a few components that depends on the volume of the droplet?
- There must be conditions under which two droplets of volume V_1 each are more stable than one droplet of volume $2V_1$
- The droplets must form through some multivalent interaction

Current approach

In our previous example, the droplets dissolved as a function of exposed surface, and the growth depended on the amount of free droplet material in the dilute phase. Could this lead to suppression of ripening?

$$J_{\text{out}} \sim \rho_I R^2$$

where ρ_I is the density of the invader. How does droplet growth look with radius? Are we even in the nucleation and growth regime for these parameters (need phase diagram)

Droplets should grow if the balance between the gas phase and the liquid drop phase is wrong.

I believe in our current example what is going is that we are merely in the situation where the invaders are merely pushing the balance between liquid/gas and gas, but not changing anything else

Towards a New Chemistry

How do we design a chemistry which is non-equilibrium in the way it was before?

We could do this with different components making up the two droplets, but this feels a bit like cheating (this is what I did in the previous paper). How do we have a single component making up the droplet where it depends on the volume of the droplet?

The only way I can think of this is schemes similar to what I proposed. The reactions occuring in the droplet have to interrupt the valency somehow (valency must be reduced by the reactions)

The previous scheme was allostery

Let's try to make the new scheme reentrance

Towards a New Chemistry 2

We want a droplet made of materials which like to phase separate, but that within those droplets they slowly produce material which is reentrant. How do we do this?

Perhaps by combining tetramers with dimers?

We can imagine a mixture, with dimers with some asymmetry and weak interactions among themselves, but strong interactions to each other?

Firstly, is there a coexistant liquid phase? And, is there a reentrant phase?

Test it