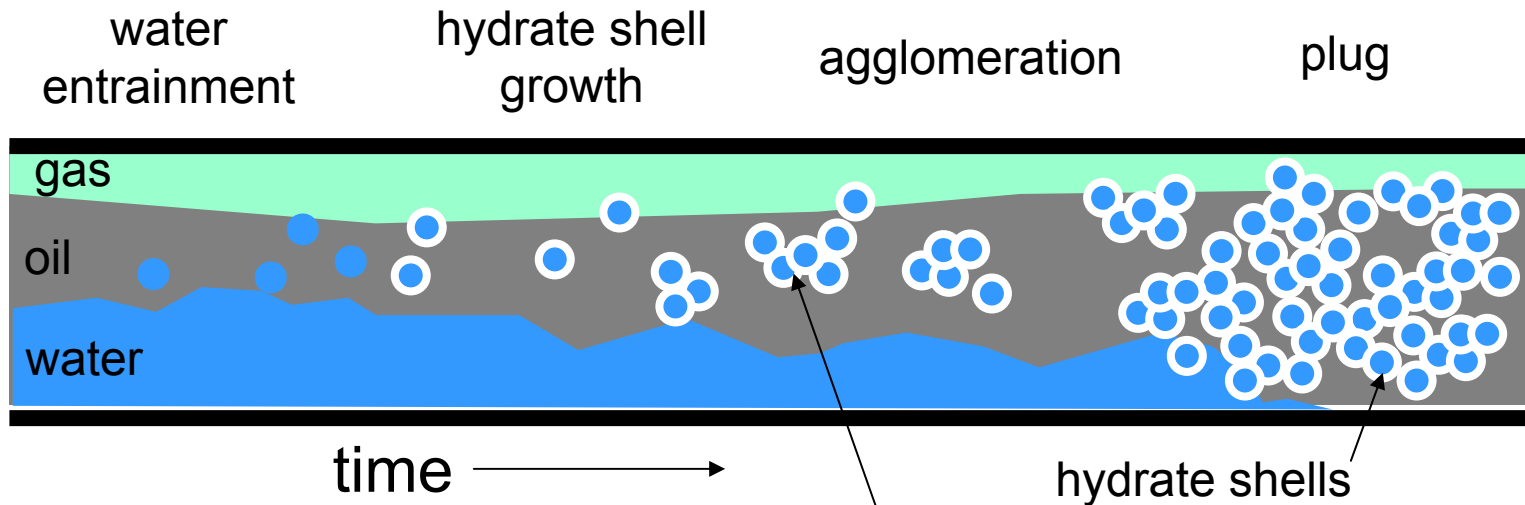
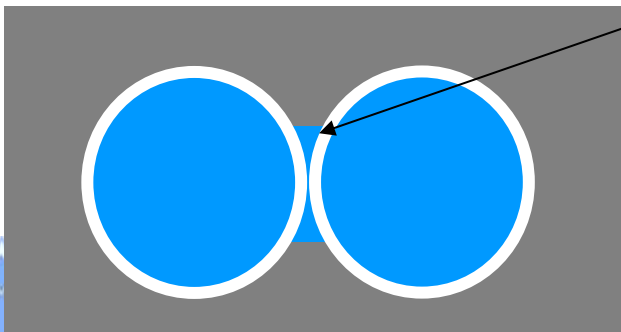


CSM: Study Emulsions & Interfaces



capillary attraction



- Water volume fraction $\phi=0.01$ to 0.5
- Plugs often $< 4\%$ hydrate (Austvik et al. 2000)

3 Hi-Impact New Technologies: Related to Interface Behavior

1. LDHI

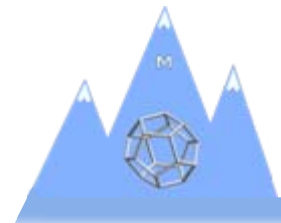
- KHI's - most used
 - Subcooling Limit $\Delta T = 20^{\circ}\text{F}$
 - No limit to water cut
- AA's – widely adopted (17 GOM fields 4/03)
 - Limit ca. 50% WC

2. Cold Flow

- Beginning flowloop/commercial tests
- Limit to 45% WC

3. Subsea Separation

- Goal: 5% WC in oil
- Troll field pilot in operation for a decade
- Single Stage Subsea/Downhole Separator



Interfaces Determine Flow Assurance

- All wells increase in H₂O production
- Some wells are H₂O driven
 - e.g. West Africa
 - Produce H₂O very early in life
- Hi H₂O: Cannot inject inhibitor economically
 - Methanol or MEG
 - AA's or Cold flow won't work with WC>50%
- Thus: For Future Flow Assurance
 - Risk Management: Cold flow, AA, Electrical Heating
 - Remove Water so WC < 50 vol%
 - Don't Pump H₂O – it's too expensive
- For Better FA Study Interfaces, not Bulk Properties

