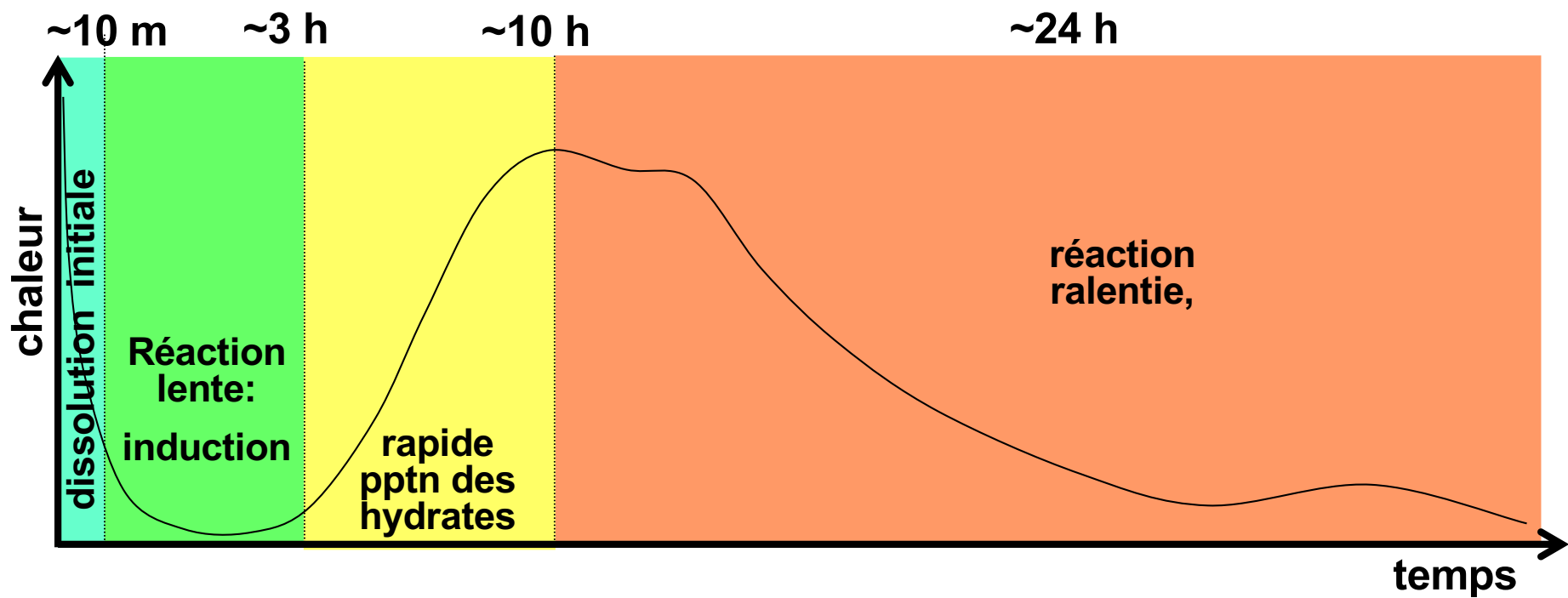
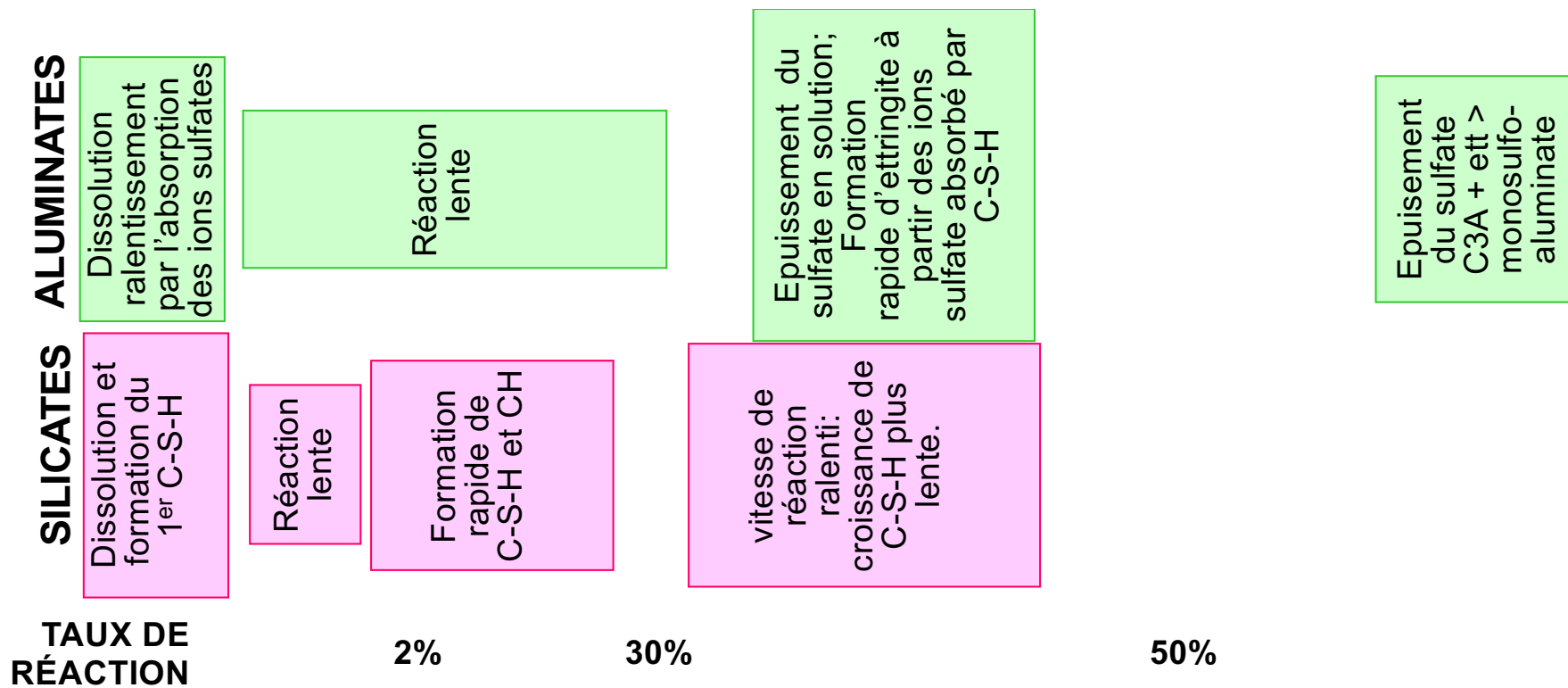
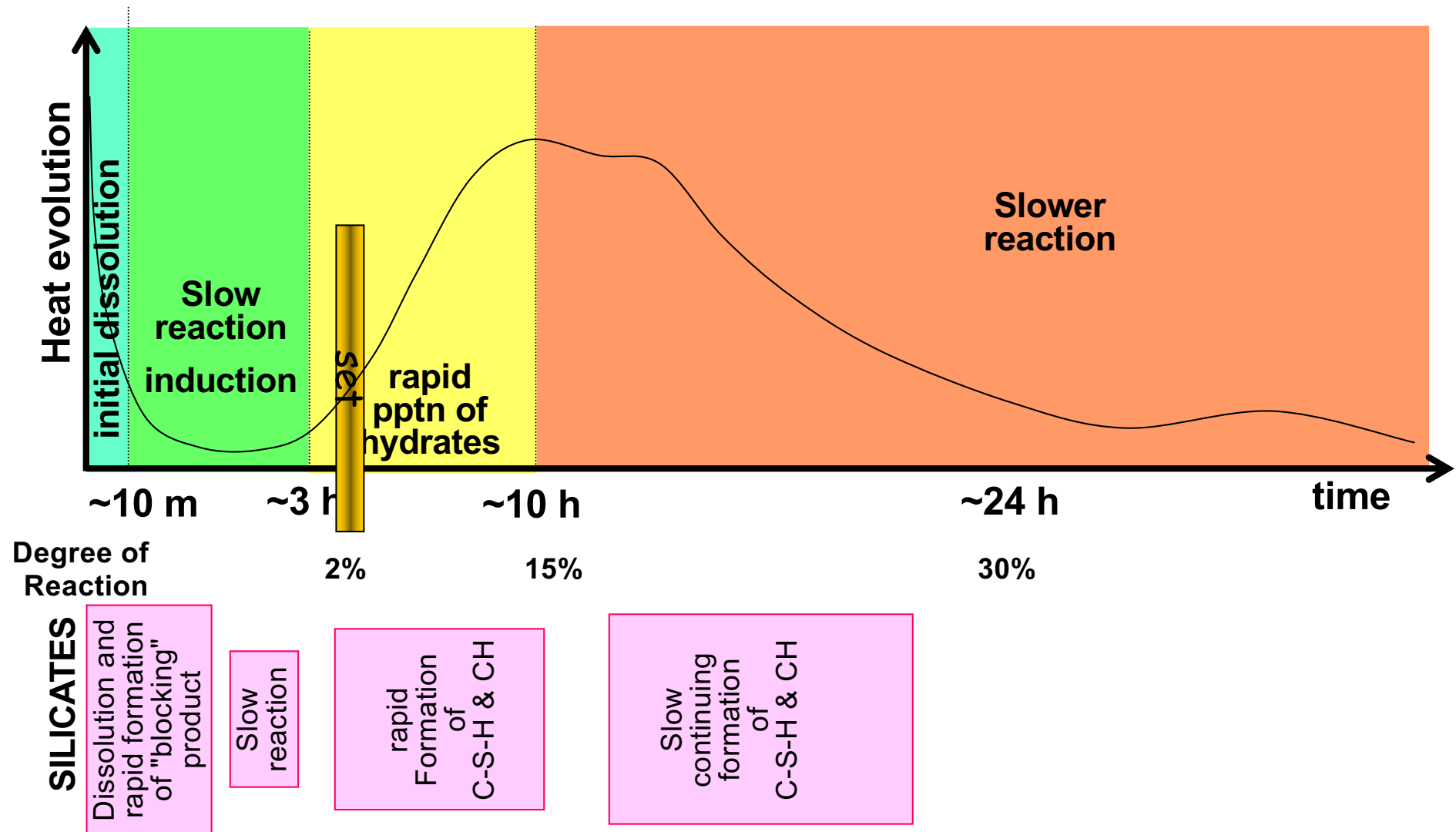


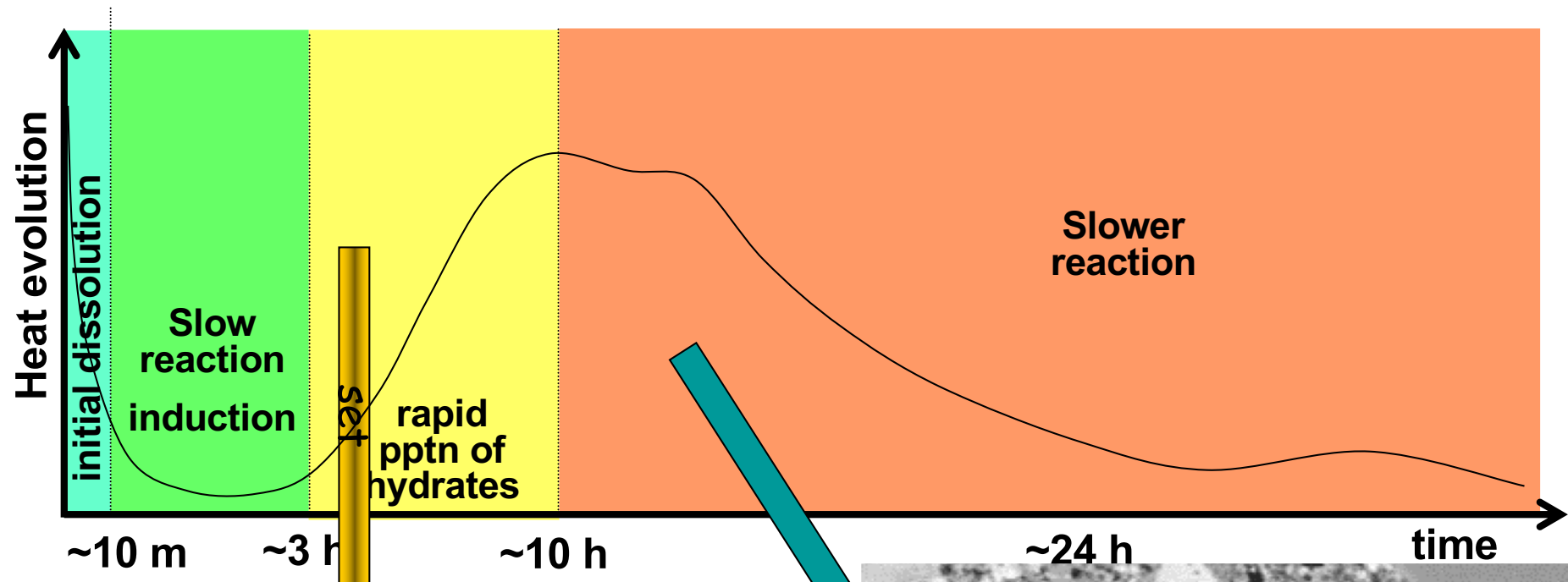
Chimie d'hydratation

Résumé de l'hydratation

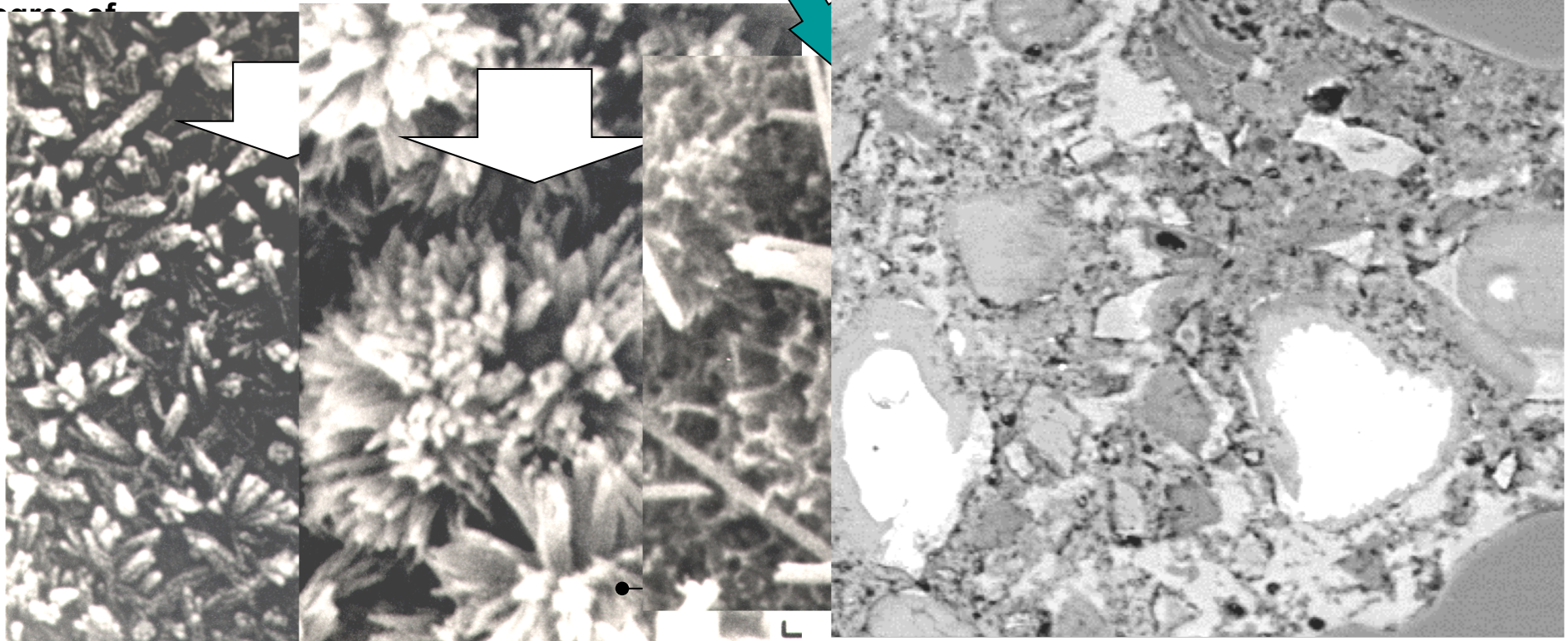




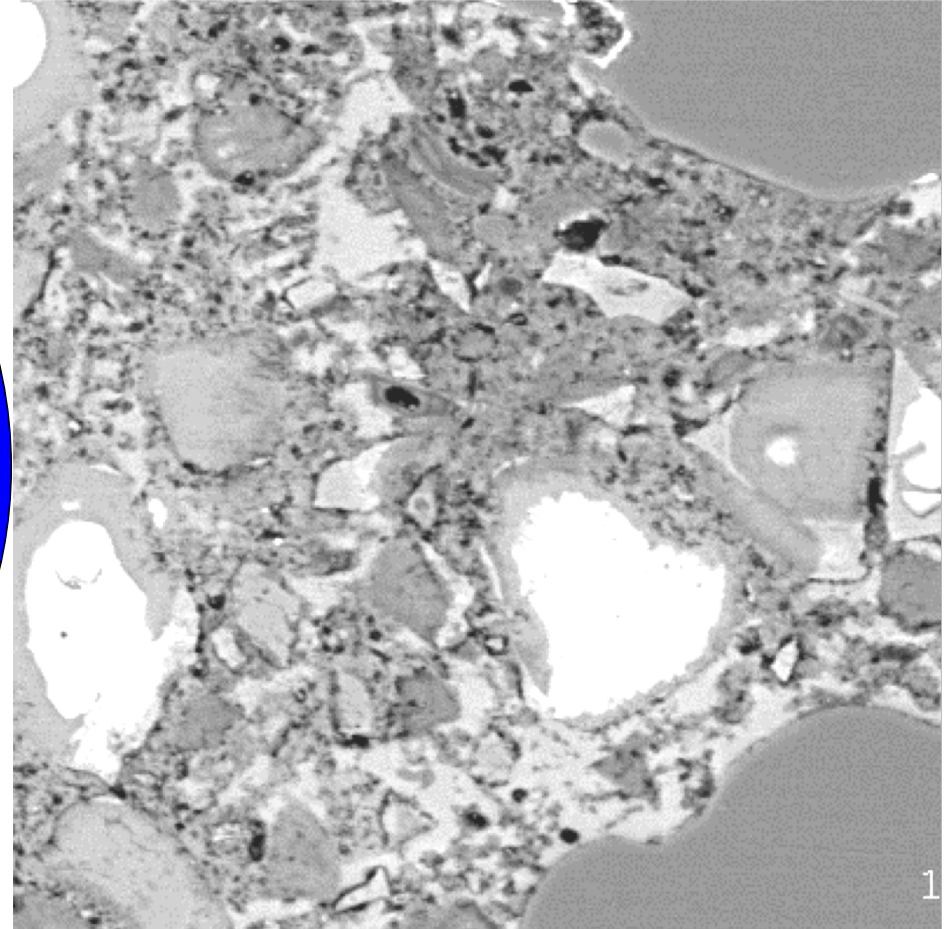
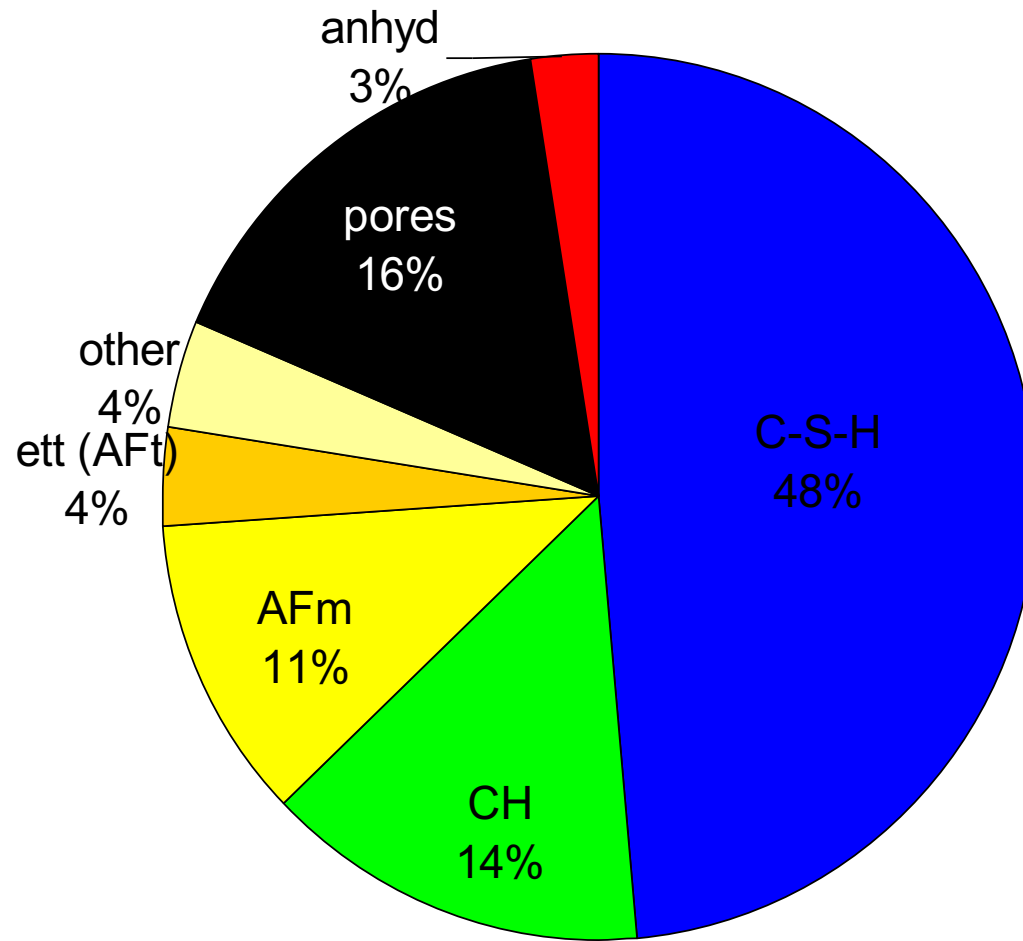
10 μm



Decrease of

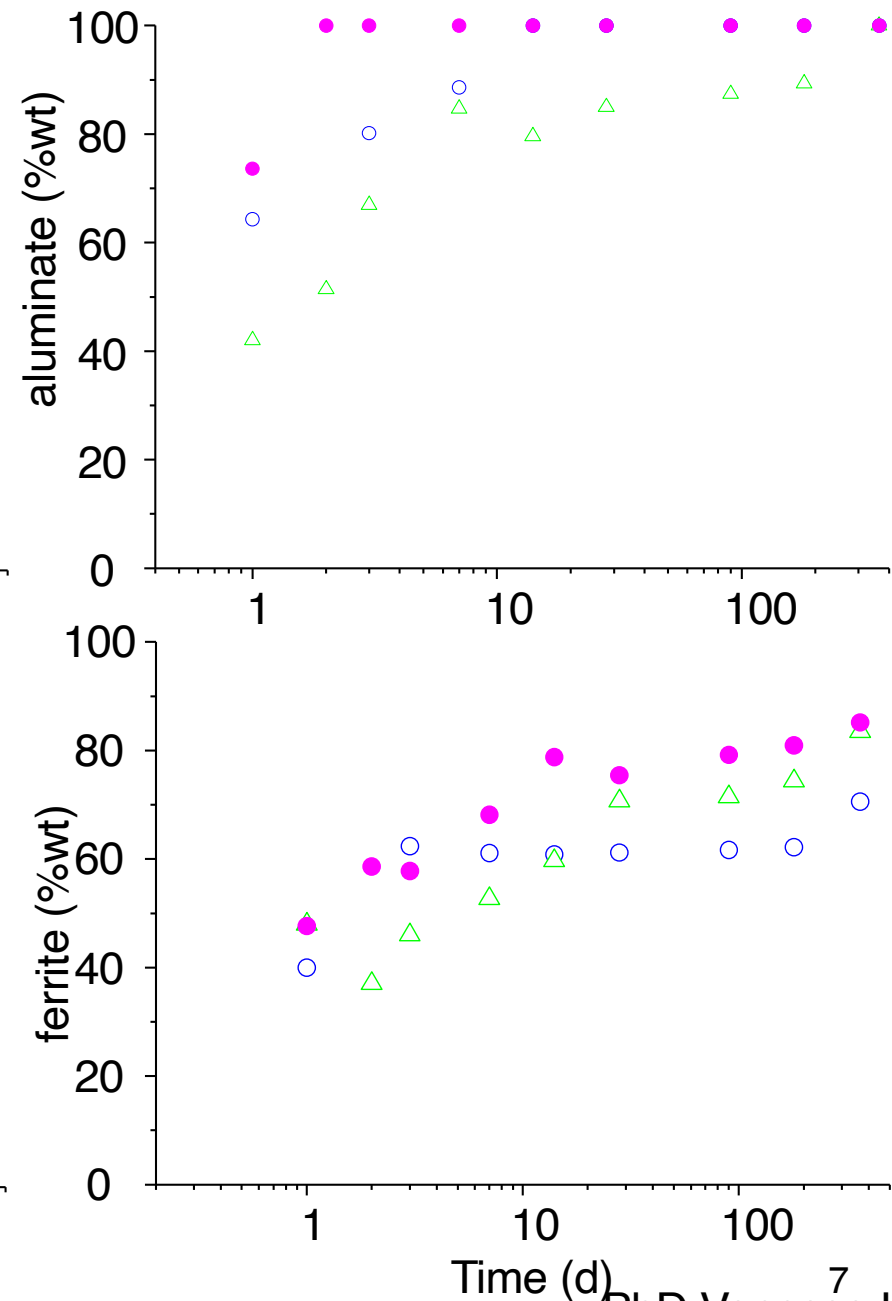
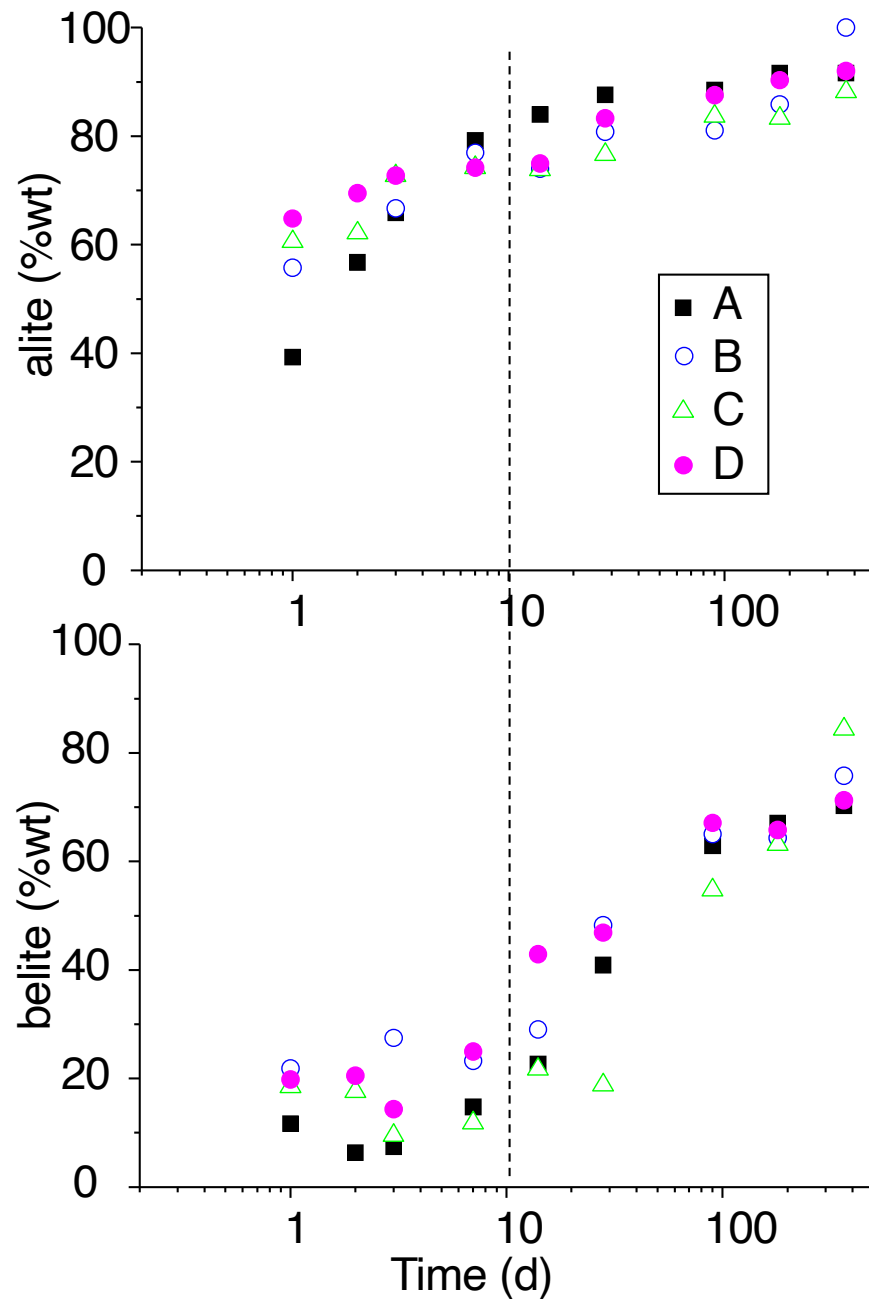


Bilan Volumétrique



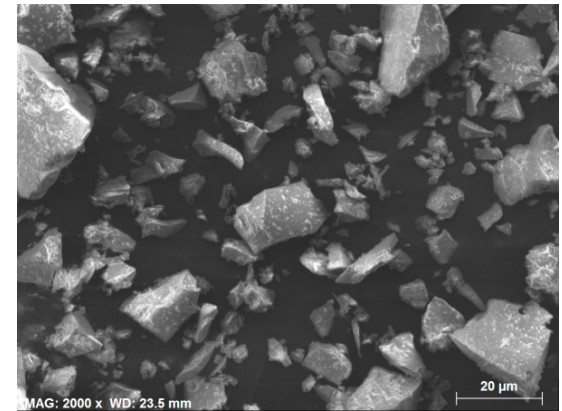
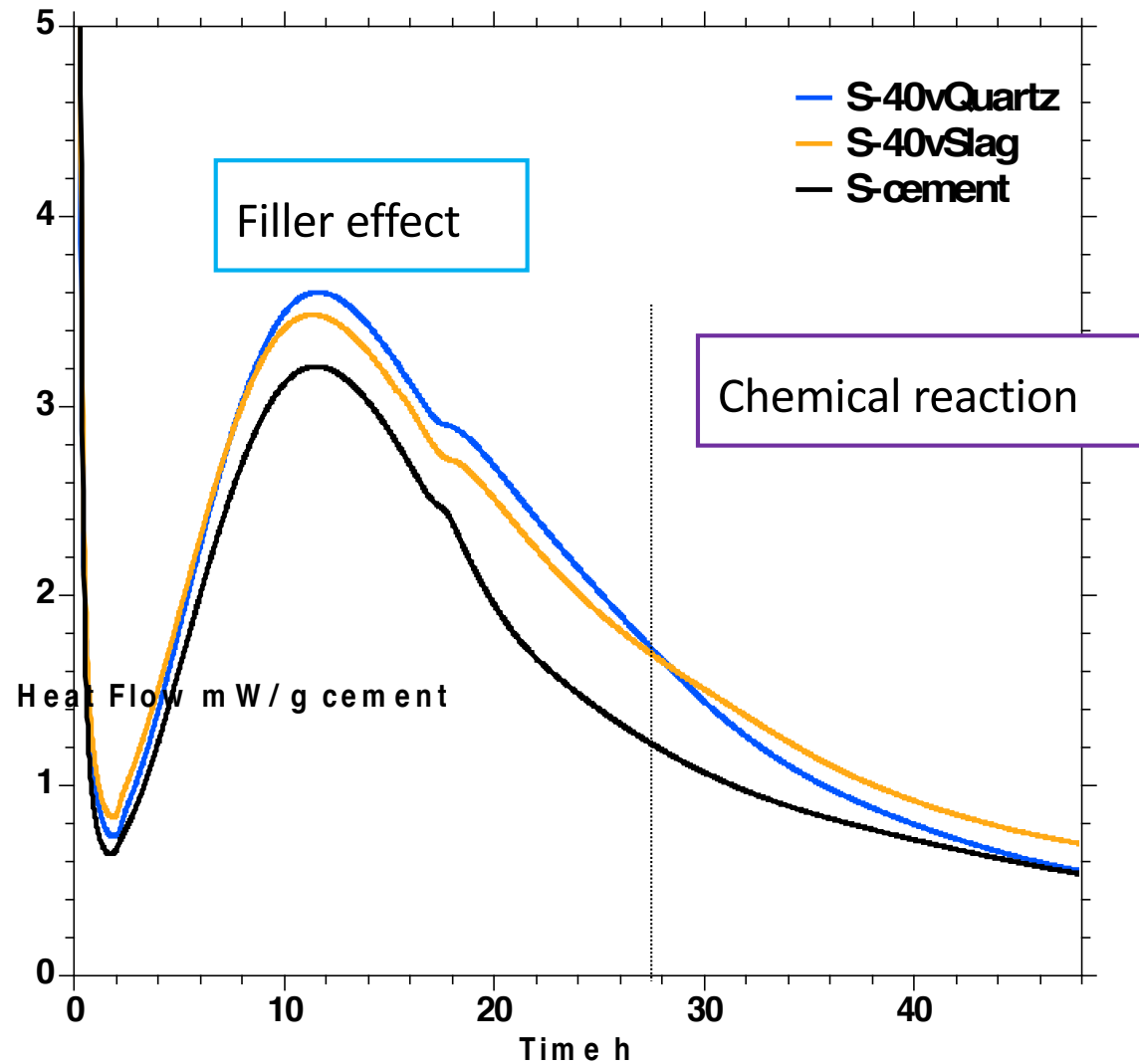
Pâte de ciment Portland, $e/c = 0,5$, 14 mois

Experimental observations of reaction of different components

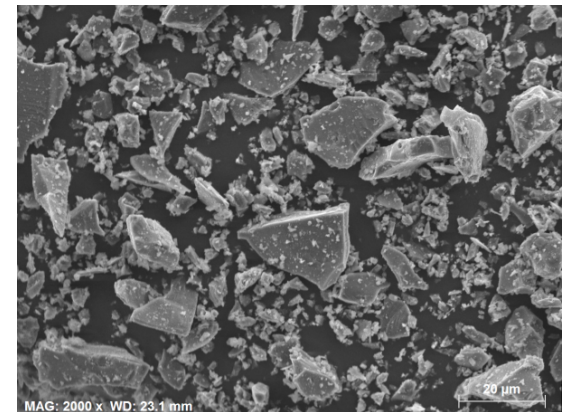


Impact of SCMs on main heat evolution peak

Physical effect on main hydration peak



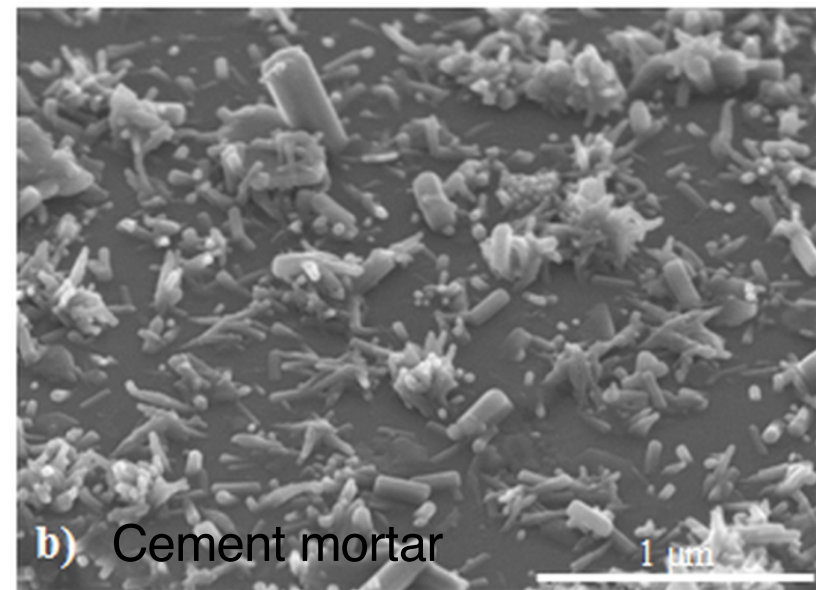
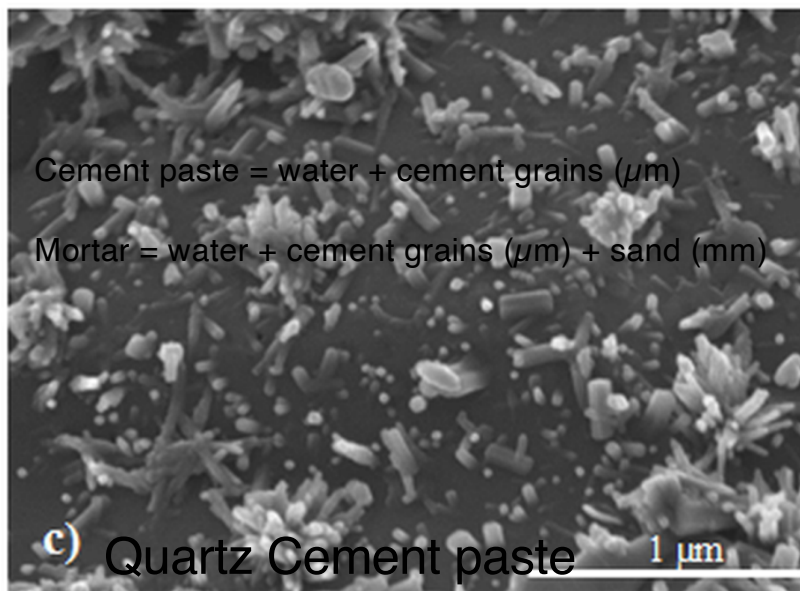
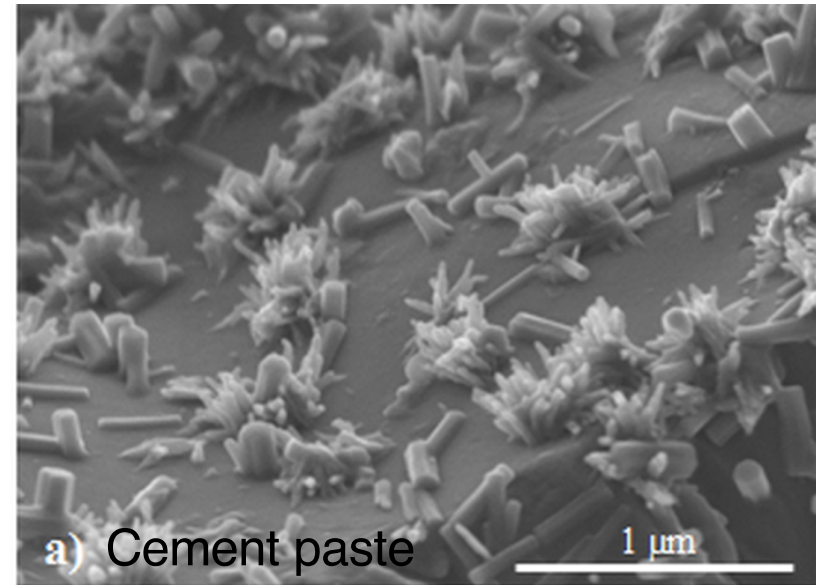
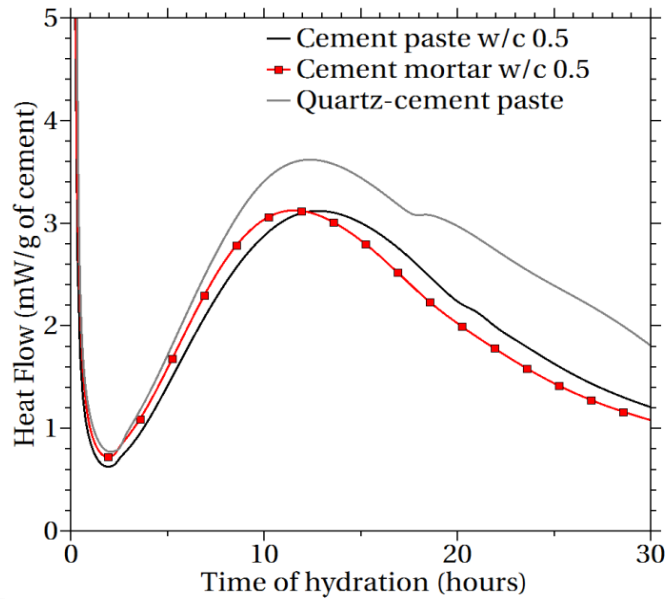
Slag



Quartz

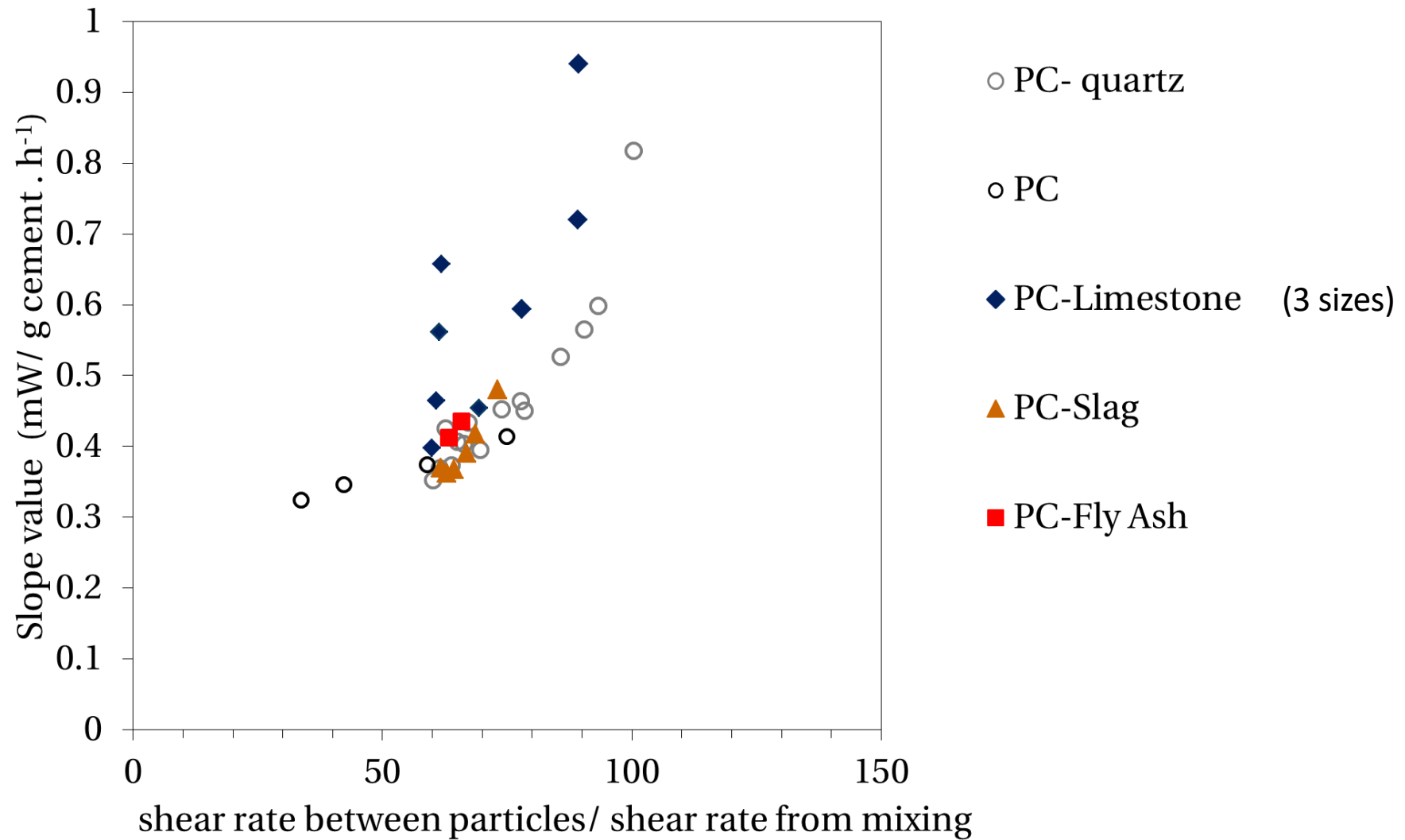
Mortar vs Paste

Berodier et al.

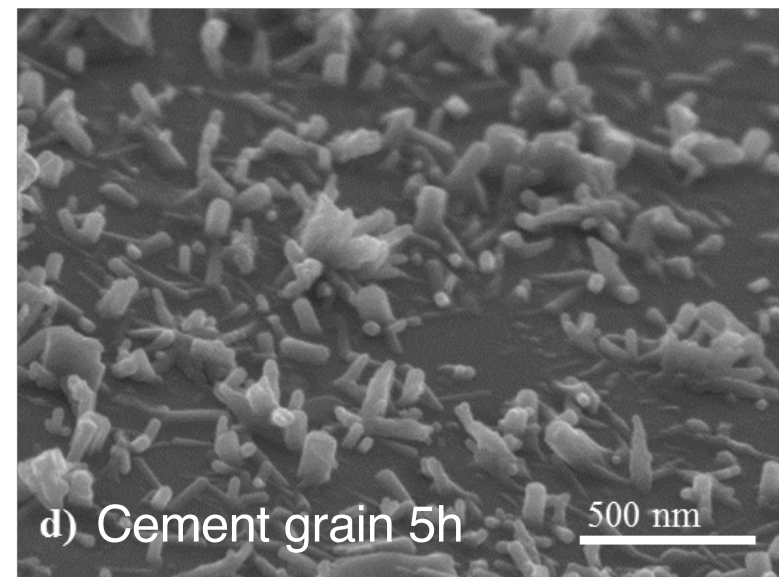
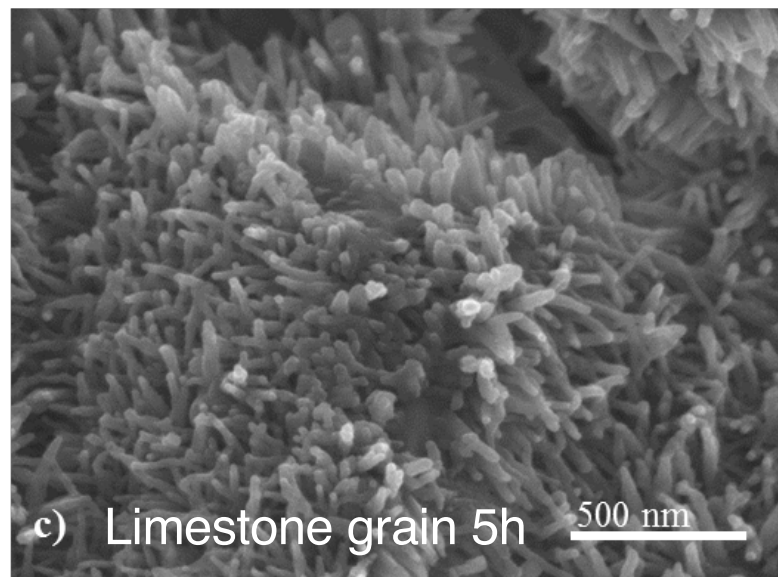
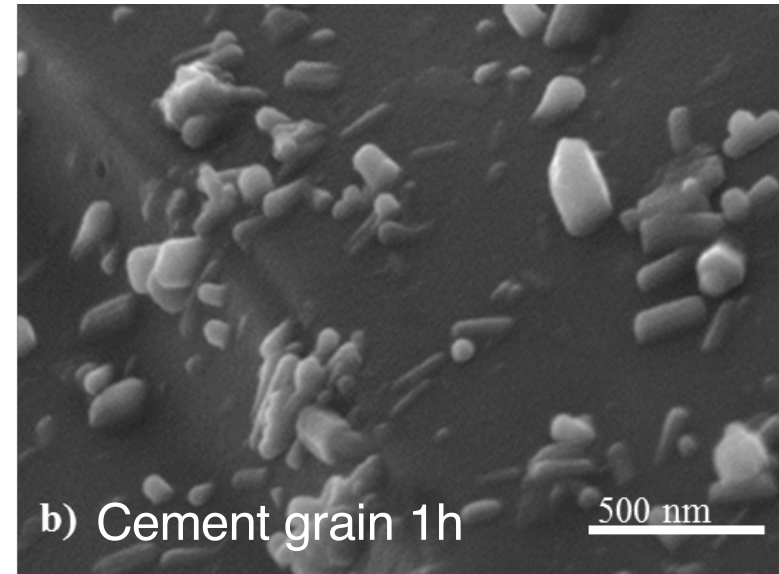
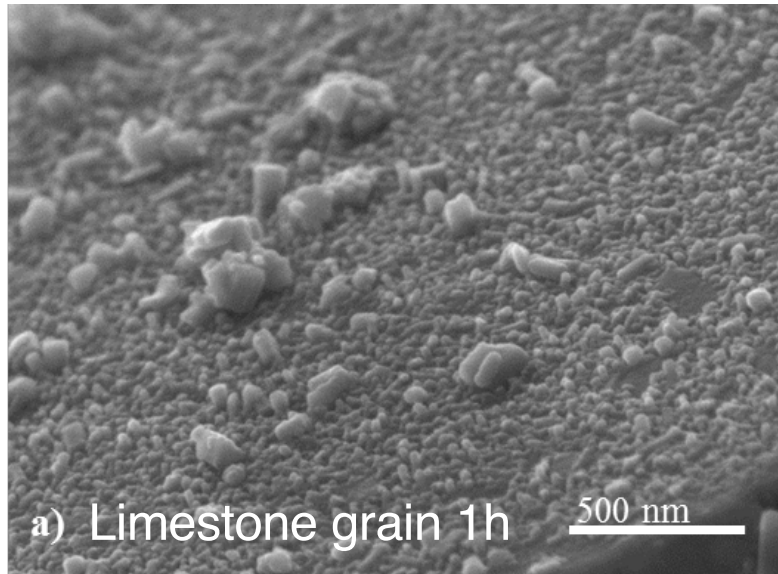


Effect of Slag, Fly ash, Limestone

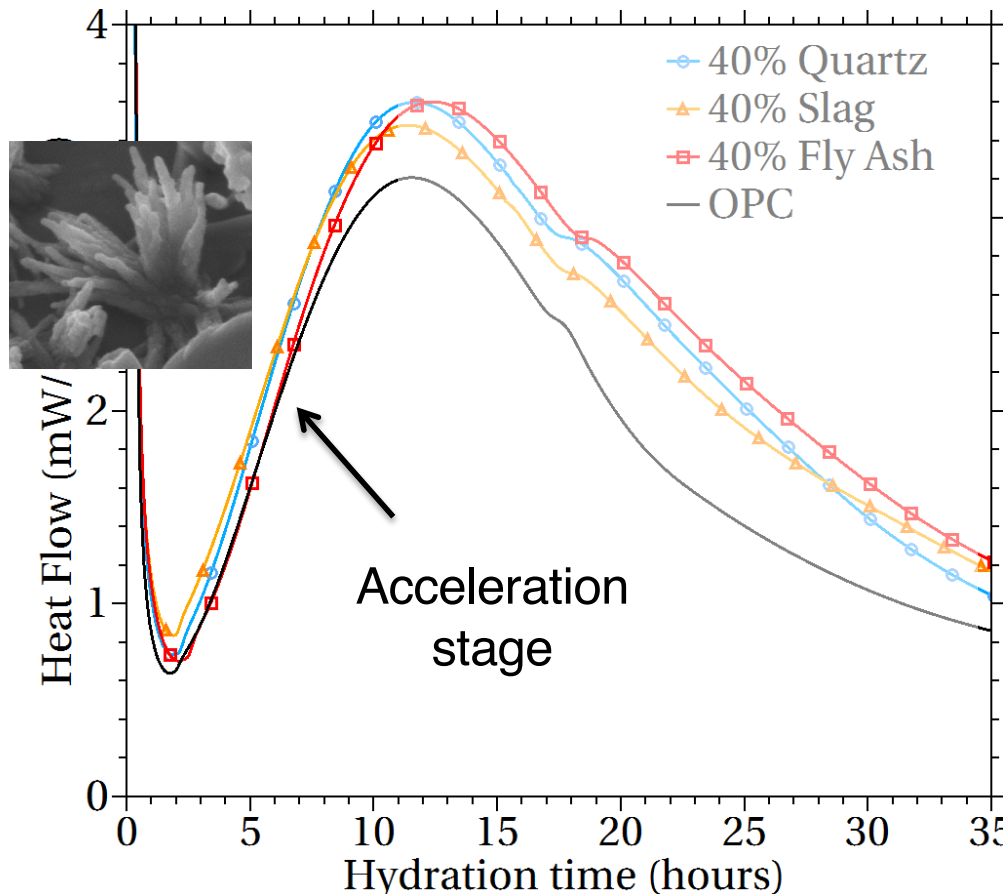
Berodier et al.



Micrographs: Cement + 40% Limestone



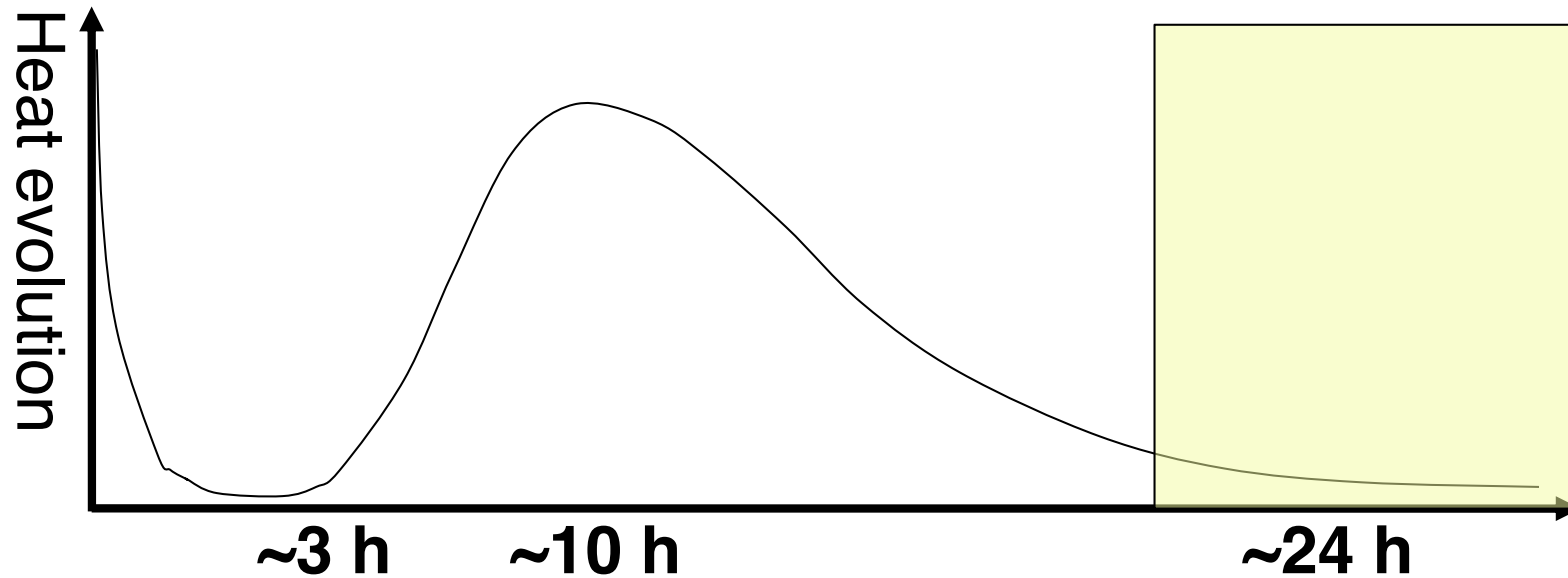
Short summary



Although inert, SCM have a significant effect on the nucleation and growth of C-S-H

- Small increase in nucleation sites ***due to the higher shearing conditions***
- Some surfaces, e.g. calcite might favor the nucleation of C-S-H and also change the growth

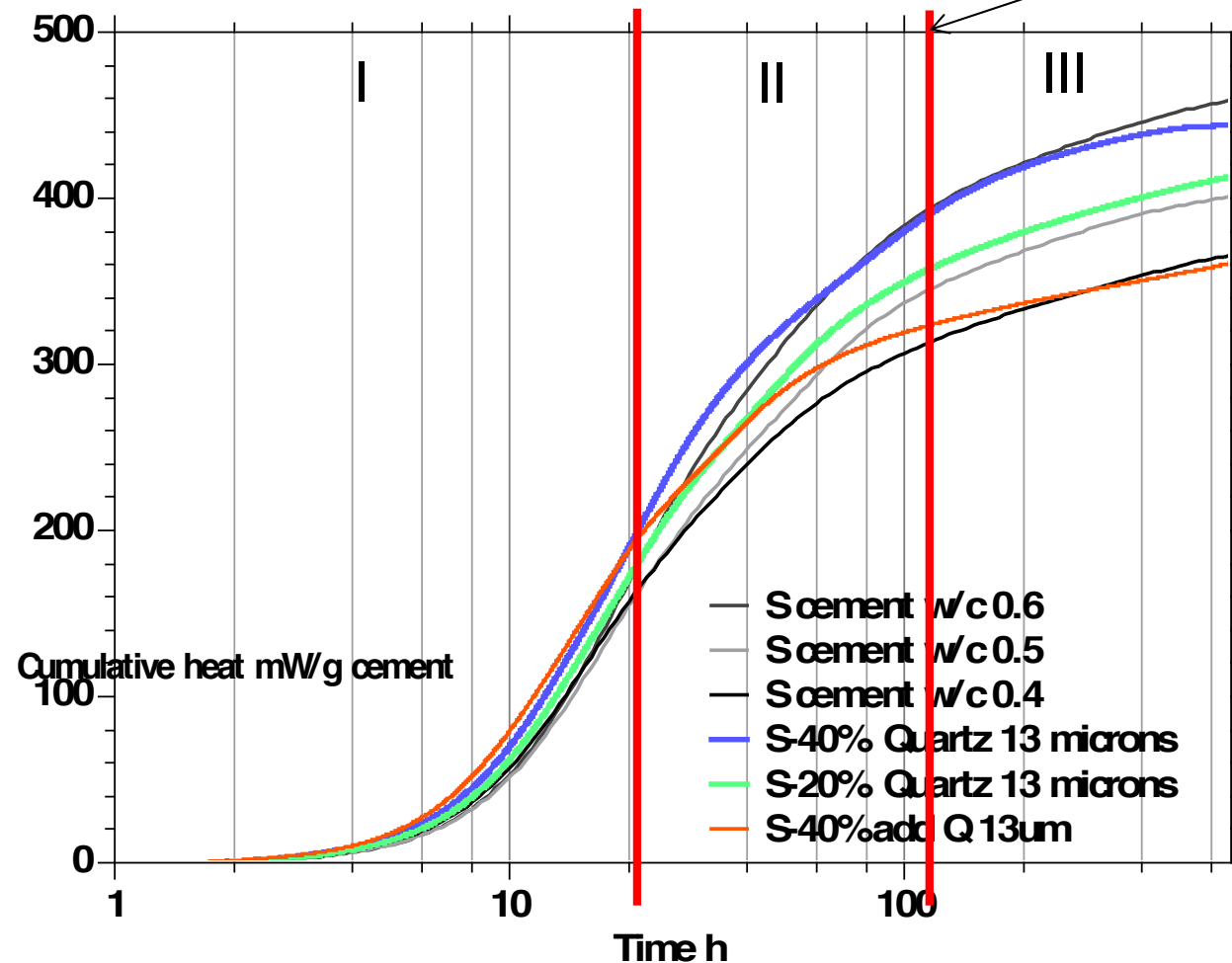
Period III, slow ongoing hydration



- Although this period is most important regarding strength development mechanisms operating have not been studied in detail.

1 or 2 regimes?

About 6 days for $w/c = 0.4$



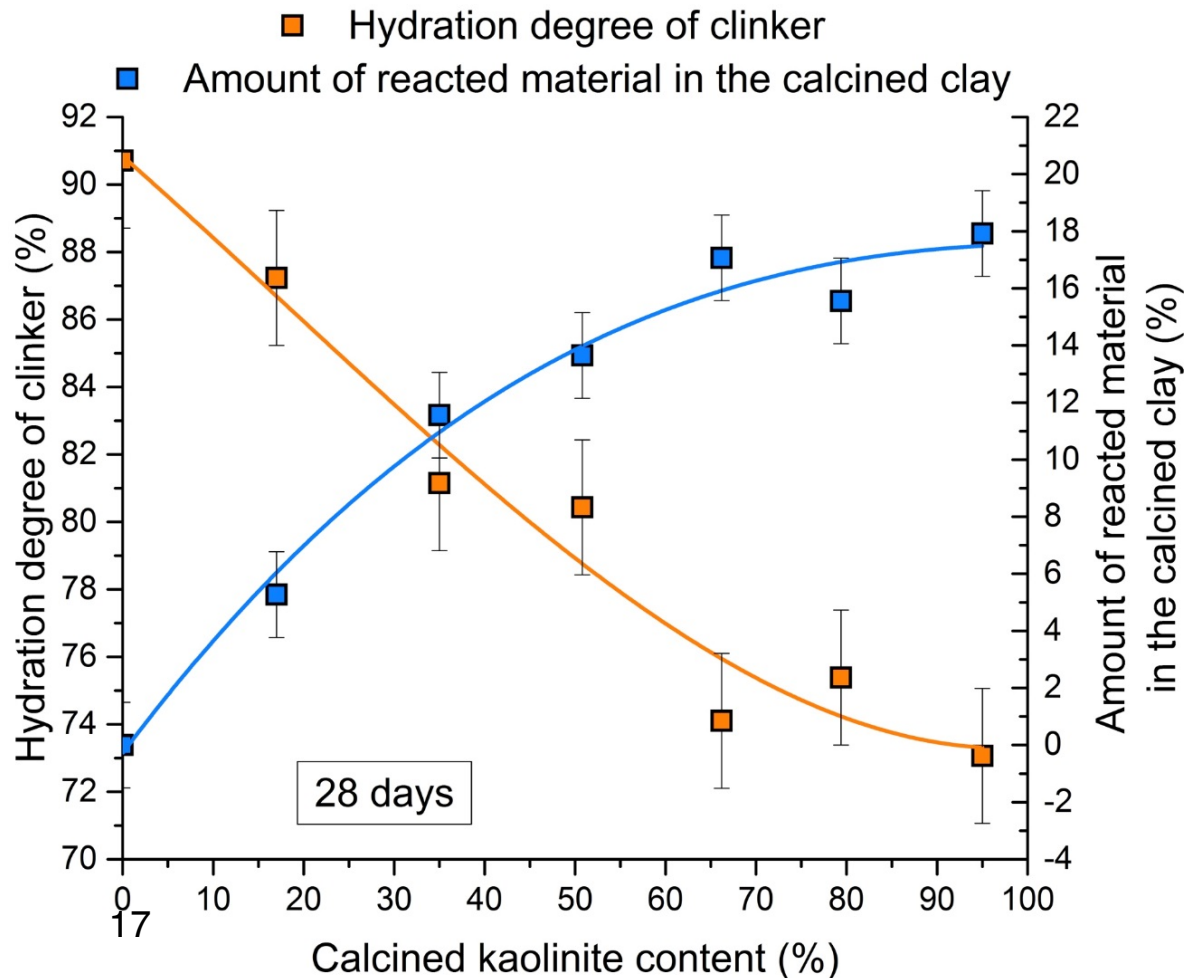
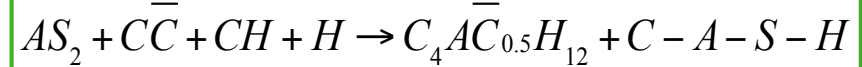
II. Space controlled

III. “densification”
similar for all
systems

Space filling

- In first week or so space filling becomes the dominant mechanism
- “competition” between clinker and SCMs
- Hydration clinker $\approx$ calcined clay $\geq$ slag $\gg$ flyash

Competition with calcined clay



» Increase of the grade of calcined clay:

» Global increase of the amount of reacted material in the calcined clay

» Decrease of clinker hydration degree

Questions

- Quelle phase contribue le plus au développement de résistance du béton de ciment de Portland?
- Quels sont les produits principaux d'hydratation de cette phase?
- Le gypse est ajouté pendant le meulage du ciment pour contrôler l'hydratation de quelle phase?
- Quels sont les produits d'hydratation les plus importants résultant de l'hydratation de la phase C3A?