

Bachelor/Master project

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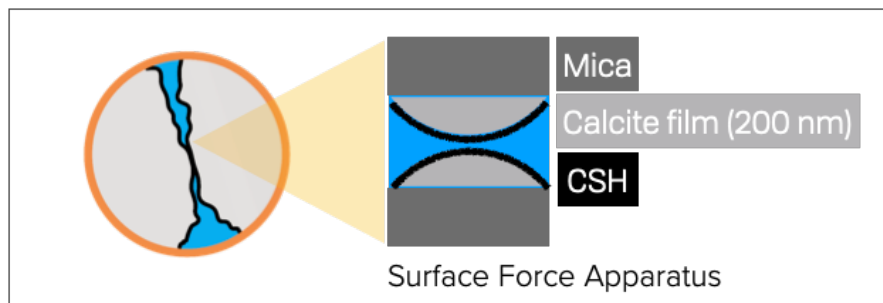
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Investigation of interaction forces between CSH surfaces

This project is part of a bilateral TU Wien collaboration between departments of technical physics (IAP) and civil engineering (bi.wwb). This collaboration is set in order to clarify one blurry and very debating aspect in the cement field: how we can quantify and control the forces between cement grains to have specific final properties (i.e. viscosity, elastic modulus...). In particular, IAP will provide information about surface structure and forces. On the other side bi.wwb will issue on the properties of fresh cement paste.

CSH, or calcium silicate hydrate, is one of the main products of the cement hydration [1]. CSH particles are formed near the contact points of the C_3S (alite, one of the cement major constituent phases) grains, influencing the cohesion of the cement slurry [2]. Due to its key role in the strength development of cement, CSH is an ideal model system to study and control both cement fresh and set properties. To fully understand such a complex system, a parallel investigation about the microscopic and macroscopic properties is needed. In particular, the investigation consists (i) at the **microscopic** level by measuring the interaction between CSH surfaces and, (ii) at the **macroscopic** level, by quantifying the influence of these interactions on fresh cement properties.

In this master project, carried out at IAP, we would like to define an experimental method to precipitate a layer of CSH particles on a calcite nano film [3] in order to measure the interaction forces between two CSH surfaces through the Surface Force Apparatus. Direct surface analysis and force measurements will be also made with Atomic Force Microscopy.



Keywords: CSH particle-synthesys, AFM, SFA, interaction forces.

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[1] Cement chemistry, H F W Taylor, Thomas Telford, 1997.

[2] Jonsson B. et al. 2005, Langmuir.

[3] Plassard C. et al. 2005, Langmuir.