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## Impact of nano-porous coatings on rates of coupled dissolution-precipitation reactions

Thursday, 2 June 2022 11:20 (15 minutes)

During fluid-rock interaction, nano-porous coatings can build up on mineral surfaces. Such coatings often form as result of coupled dissolution-precipitation reactions and are thought to impede reaction rates. While this effect is widely recognized, a complete mechanistic description of the way coatings impact mineral reaction rates has not yet been developed. In this study, we present a boundary layer model that predicts the rates of coupled primary mineral dissolution and secondary phase formation in the presence of a nano-porous coating. Our simulations show that as the thickness of the coating increases, reaction rates can drop by orders of magnitude. The magnitude of the effect is determined by the porosity and tortuosity of the layer, as well as a complex interplay between the rate constants in the reaction rate equations. In contrast to natural mineral grains in soils and rocks, minerals used in laboratory dissolution experiments are usually coating-free, and our results suggest that this difference could account for the much slower dissolution rates that are measured under field conditions.

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### Country

Israel

### References

### Time Block Preference

Time Block B (14:00-17:00 CET)

### Participation

Online

**Primary author:** EMMANUEL, Simon (The Hebrew University of Jerusalem)

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**Session Classification:** MS23

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