

**Reactive crystallization at the crust-mantle  
boundary and its role into the composition of the  
oceanic crust**

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Observations on abyssal peridotites suggest that chemical interactions with the surrounding peridotites occur during the migration of parental MORB through the shallow mantle [1]. During the early stage of cooling, this melt-rock reaction process can be associated with the crystallization of new magmatic phases, whose compositions are constrained by interaction with the enclosing mantle. This process (hereafter referred as reactive crystallization) causes the composition of the reacting melt to deviate from melts evolving through fractional crystallization in response to chemical exchange with the mantle peridotites [2]. At low pressure, these melt-mantle reaction processes originate dunites, primitive (olivine-rich) troctolites and olivine gabbro (norites), a peculiar association often collected at the crust-mantle transition in Mid Ocean Ridges. These rocks may hence represent the perfect case where the chemical modifications of melts evolving through reactive crystallization processes can be investigated. In this contribution, I discuss the role of reactive crystallization on the composition of the oceanic crust and MORB, with emphasis on study cases from the Atlantic and Indian Oceans and the Philippine Sea. I show that reactive crystallization can have a profound chemical effect at low magma supplies, where the crust-mantle boundary acts as a reactive filter for the melts delivered to the surface.

[1] Dick, H. J. B., Fisher, R. L. & Bryan, W. B. Mineralogical variability of the uppermost mantle along mid-ocean ridges. *Earth Planet. Sci. Lett.* 69, 88-106 (1984).

[2] Collier, M. L. & Kelemen P. B. The case for reactive crystallization at mid-ocean ridges, *J. Petrol.* 51, 1913–1940 (2010).