# Redox variation of erupting magma during Strombolian activity

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Strombolian eruption is often considered as burst of gas slug (gas-rich magma) ascending from deeper source, which mingles with dense magma at shallow conduit during eruption [1, 2]. As an interaction of the gas slug and dense magma plays important roll on gas and pressure releases, their mechanism is key to understand dynamics of Strombolian activity [3].

Volcanic ash erupted by ongoing activity at Stromboli volcano contains two type of volcanic glass as brown and black glasses. Compositional and FTIR analyses shows that the two glasses have almost identical composition ($SiO_2$ = 52wt.%; S = < 100ppm) and water content (= < 0.1wt.%). In contrast, Fe-K edge μ-XANES (micro X-ray Absorption Near Edge Structure) spectroscopy demonstrates black glass ($Fe^{3+}/\Sigma Fe$ = 0.28-0.80) is more oxidized than brown one ($Fe^{3+}/\Sigma Fe$ = 0.24-0.42). This heterogeneity in redox state of erupting magma is caused by different degree of interaction between atmospheric oxygen and magma. The brown glass often exhibits elongate and vesicular shape showing less viscous, gas slug origin. In contrast the black glass originates welded material of magma fragments fallen back to the vent which interacts with oxygen. We propose that the dense magma at shallow conduit consists of the black glass magma with other recycle products [4], and mingles with gas slug upon Strombolian explosion.

[1] Burton et al. (2007), *Science*, 317, 227-230. [2] Lautze and Houghton (2005), *Geology*, 33, 425-428. [3] Del Bello et al. (2015), *EPSL*, 423, 210-218. [4] Guriori et al. (2014), *JGR-Solid Earth*, 119, 319–345.