

# Experimental research on anorthite carbonation in simulated flue gas

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## Materials and Methods

Mineral carbon sequestration is the only known form of permanent CO<sub>2</sub> storage[1]. Anorthite, as one of the most abundant sources of calcium in the earth's crust, may play an important role for CO<sub>2</sub> and SO<sub>2</sub> storage[2] [3]. This research aims to characterization of interaction between the flue gas and anorthite in the lower temperature and pressure, to help us understand anorthite environmental effects.

**Fig 1:** SEM microimages and EDX spectrum of the residues after anorthite reaction with pure CO<sub>2</sub>

## Discussion of Results

The transformation efficiency of anorthite carbonation could reach 88.61% with the reaction temperature 200°C, the pressure 2MPa, the periods 4 hours. The anorthite was pretreated by nitric and acetic acids in the atmosphere of pure CO<sub>2</sub>. SO<sub>2</sub> in the oxygen-riched flue gases was not benefit for deposition of CaCO<sub>3</sub>.

Carbonation reaction of anorthite could be attributed to the surface chemical reaction [4]. The CaCO<sub>3</sub> covered on the anorthite surface might hinder continues reaction. The released of Ca<sup>2+</sup> ions could be accelerated through adding of the nitric and acetic acids in the reaction solution [5] and raise the transformation efficiency of anorthite carbonation. The addition of buffering agents would help deposition of calcium carbonate on the surface of anorthite, raise the transformation efficiency of the mineral carbonation.

[1] Seifritz (1990) *Nature* **345**, 486. [2] Munz *et al.* (2012) *GeoCosActa* **77**, 27–51. [3] Ayris *et al.* (2012) *GeoCosActa* **110**, 58–69. [4] Bobicki *et al.* (2015) *MaterEng.* **27**, 1615–1622. [5] Baldyga *et al.* (2010) *MaterLett.* **64**, 702–704.