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Type: Oral Presentation

Microstructural and mineral phase changes of reinforced concrete caused by high concentration CO₂

Tuesday, 31 May 2022 11:30 (15 minutes)

At present, reinforced concrete is the most commonly used building material. Due to possible CO₂ reservoir leakage, reinforced concrete may be corroded by high concentration CO₂ (> 1 atm CO₂ partial pressure). In order to study the effects of corrosion time, CO₂ partial pressure and relative humidity (RH) on structural deterioration of reinforced concrete exposed to high concentration CO₂, reinforced concrete samples were prepared and corroded by 0.1, 0.5 and 1.0 MPa high purity CO₂ under water immersion, dry gas and 70% relative humidity conditions. The mineral phase changes of the samples were characterized by X-ray diffraction (XRD) and energy dispersive X-ray spectroscopy (EDS), and the structural changes of the samples with different corrosion times were characterized by micron computed tomography (μ -CT). The μ -CT images were analyzed by Avizo software, and the images showed that the concrete corroded by CO₂ produced calcium carbonate, which was mainly deposited in pores. The reinforcement corroded by CO₂ produced iron oxide and iron hydroxide, mainly deposited on the contact interface between reinforcement and concrete. The corrosion products of reinforcement filled the pores around the reinforcement and penetrated into concrete with the development of corrosion time, which caused cracks to generate and expand. The corrosion degree increased with the increase of corrosion time and CO₂ pressure, and the corrosion of reinforced concrete samples immersed in water was the most serious.

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References

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

Online

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Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies