

## **An overview of supplementary cementitious materials addition on carbonation curing of cement based construction materials**

Rizwan Hameed<sup>1</sup>, Issam T. Amr<sup>2</sup>, Bandar A. Fadhel<sup>2</sup>, Rami A. Bamagain<sup>2</sup>, Ali S. Al Hunaidy<sup>2</sup>, Joonho Seo<sup>3</sup>, Solmoi Park<sup>4</sup> and H.K. Lee<sup>5,\*</sup>

<sup>1, 3, 4, 5</sup> *Department of Civil and Environmental Engineering, KAIST, South Korea*

<sup>2</sup> *Carbon Management Division, Research & Development Center, Saudi Aramco, Dhahran, Saudi Arabia*

\* *Corresponding author. Tel: +82 42 350 3623; E-mail address: [haengki@kaist.ac.kr](mailto:haengki@kaist.ac.kr)*

### **ABSTRACT**

Cement industry is one the major sources of global anthropogenic emissions with approximately 5-8% contributions to the man-made CO<sub>2</sub> [1,2]. Cement industry and environmental protection agencies are in effort to reduce these emissions by using different approaches [3]. One of these approaches, gaining attention in recent years is the carbonation curing of cement-based materials. This process involves exposure of cement to high concentrations of atmospheric CO<sub>2</sub> in premature state [3-5]. Cement system can be considered as a sink to store CO<sub>2</sub> [4-6]. In this work, early carbonation curing of cement-based construction materials, CO<sub>2</sub> sequestration and effect of supplementary cementitious materials on carbonation curing will be reviewed.

**Keywords:** *Carbonation curing, cement, concrete, carbon dioxide*

### **ACKNOWLEDGEMENT**

This study was supported by the Saudi Aramco-KAIST CO<sub>2</sub> Management Center to whom the authors are grateful.

### **REFERENCES**

- [1] R. Kajaste and M. Hurme, "Cement industry greenhouse gas emissions - Management options and abatement cost," *J. Clean. Prod.*, vol. 112, pp. 4041–4052, 2016.
- [2] D. L. Summerbell, C. Y. Barlow, and J. M. Cullen, "Potential reduction of carbon emissions by performance improvement: A cement industry case study," *J. Clean. Prod.*, vol. 135, pp. 1327–1339, 2016.
- [3] S. Monkman and M. MacDonald, "On carbon dioxide utilization as a means to improve the sustainability of ready-mixed concrete," *J. Clean. Prod.*, vol. 167, pp. 365–375, 2018.

---

<sup>1</sup> Graduate Student

<sup>2</sup> Researcher

<sup>3</sup> PhD Student

<sup>4</sup> Post-doctoral Researcher

<sup>5</sup> Professor