

Luminescent Cement

Slippery**Rock**
University®

Engineering Materials: ENGR 220

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- What Is Luminescent Cement
- How Is It Made

- Mechanical Properties
 - Luminescent
 - Compressive
 - Flexural

- Summary



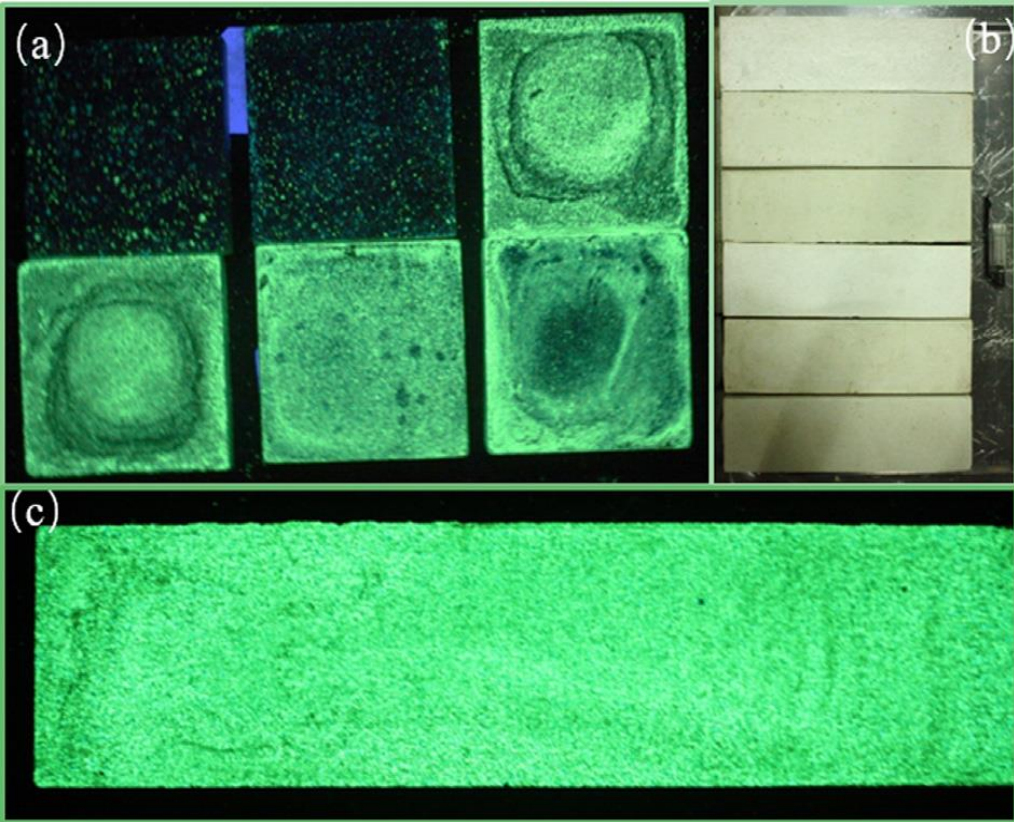


What is Luminescent Cement?

- Luminescent cement is a composite of:
 - White Portland Cement
 - Reflective Powder (RP)
 - Luminescent Powder (LP)
- Long Afterglow lasting up to 8 hours
- Used for : Construction, Design, and Safety Applications

Photo from: GBC Safety Glow





How Is Luminescent Cement Made?

- Composite of:
 - White Portland Cement
 - Reflective Powder (RP)
 - Luminescent Powder (LP)

- Ideal composition:
 - 7% Reflective Powder
 - 30% - 35% Luminescent powder

Self-luminescent cement-based composite materials: Properties and mechanisms. *Construction and Building Materials*



Home Depot

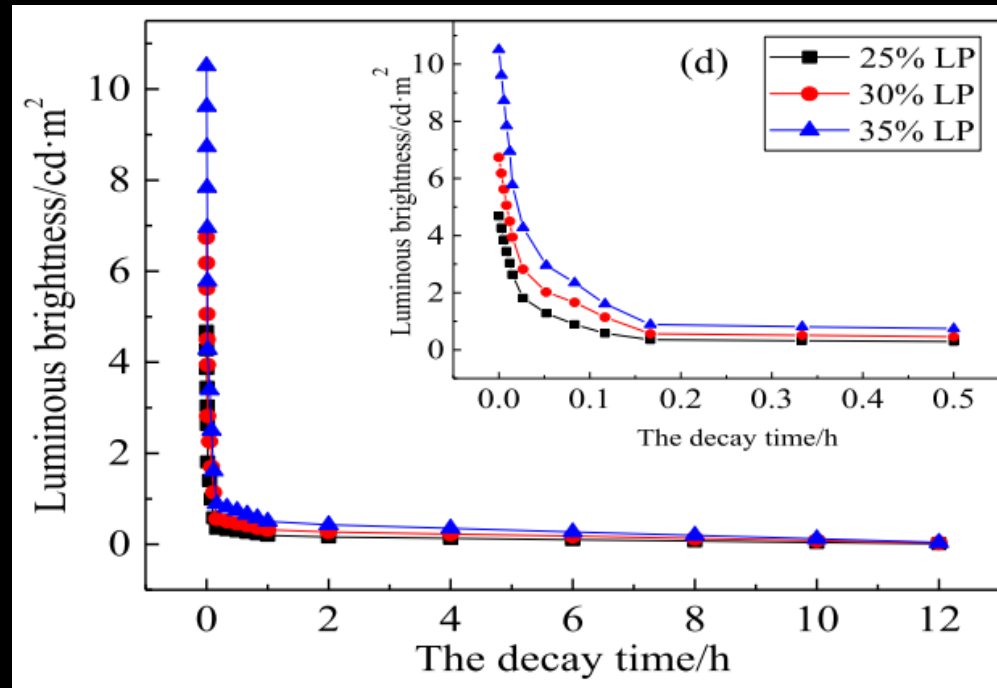


Strontium Aluminate
Techno Glow



Mechanical Properties

Luminous Properties



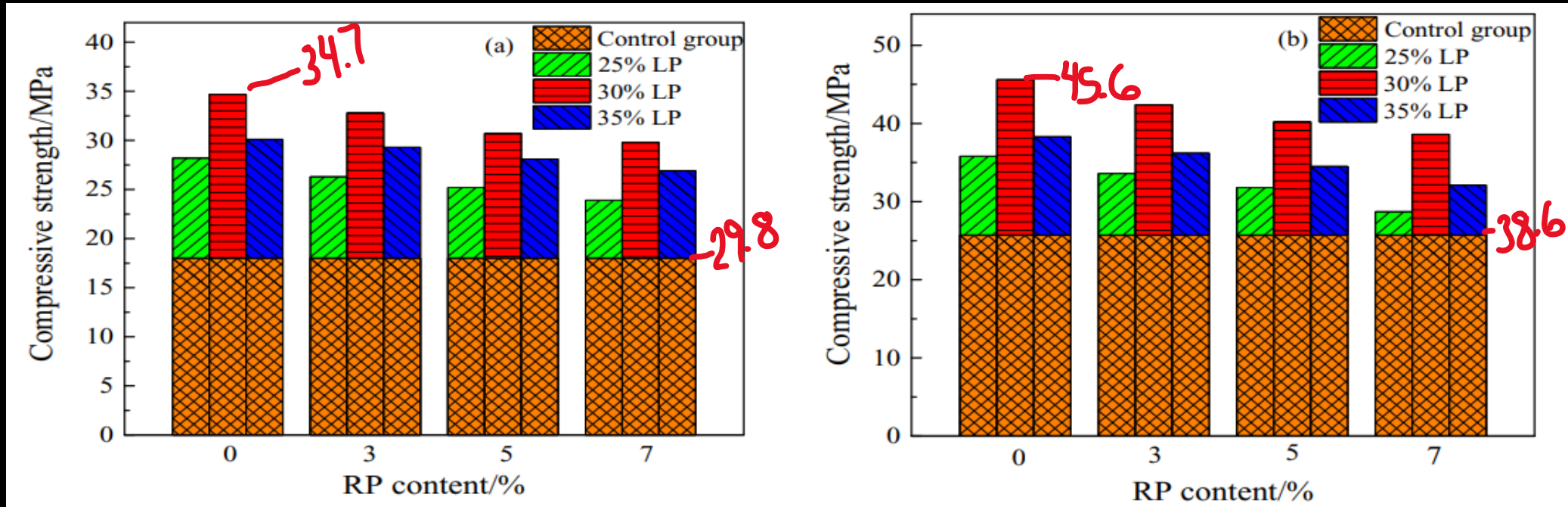
Characteristics analysis of self-luminescent cement-based composite materials with self-cleaning effect. *Journal of Cleaner Production*

- Optimum formula 7% RP 35% LP
- Highest Initial and sustained brightness
- 8 hour afterglow



Mechanical Properties

Compressive Strength



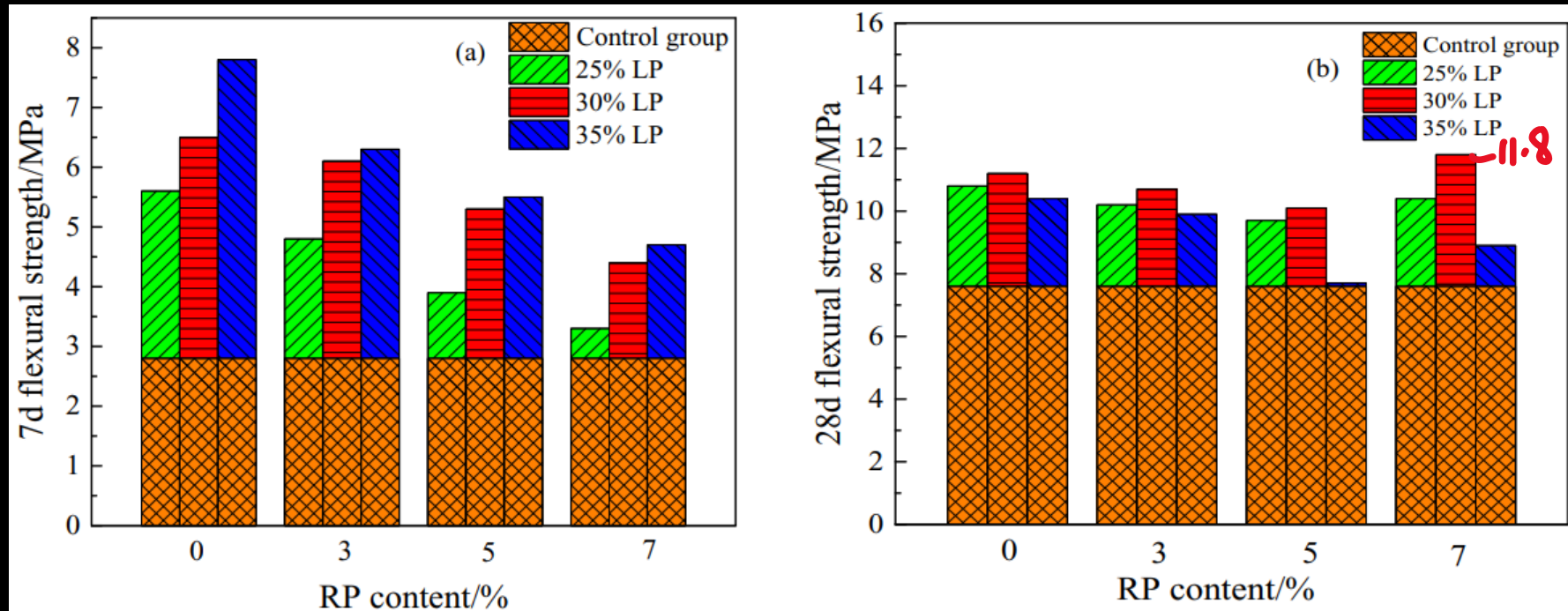
Characteristics analysis of self-luminescent cement-based composite materials with self-cleaning effect. *Journal of Cleaner Production*

- Optimum formula 0%RP 30%LP
- 7-day strength control 29.8MPa luminescent 34.7 MPa
- 28-day strength control 38.6MPa luminescent 45.6 MPa



Mechanical Properties

Flexural Strength



Characteristics analysis of self-luminescent cement-based composite materials with self-cleaning effect. *Journal of Cleaner Production*

- Optimum formula 7%RP 30%LP
- 28-day strength luminescent 11.8 MPa



One additional Question

- Luminescent Powder < 100 μm
- Reflective Powder < 120 μm
- Would increasing size of aggregates affect mechanical properties?



Summary

- Composite material 7% RP and 30-35% LP
- Used for construction, design, safety applications
- Increased compressive and flexural strength
- Long Afterglow up to 8 hours



Thank You!

References:

- He, B., Gao, Y., Qu, L., Duan, K., Zhou, W., & Pei, G. (2019). Characteristics analysis of self-luminescent cement-based composite materials with self-cleaning effect. *Journal of Cleaner Production*, 225, 1169-1183. doi:<https://doi-org.proxy-sru.klnpa.org/10.1016/j.jclepro.2019.03.291>
- Wang, W., Sha, A., Lu, Z., Jia, M., Jiang, W., Liu, Z., & Yuan, D. (2021). Self-luminescent cement-based composite materials: Properties and mechanisms. *Construction and Building Materials*, 269, 121267. doi:<https://doi-org.proxy-sru.klnpa.org/10.1016/j.conbuildmat.2020.121267>

