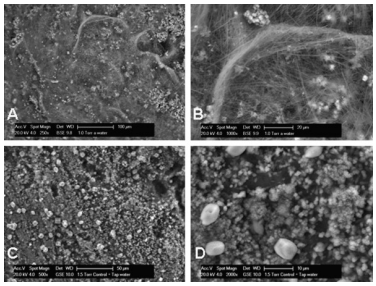
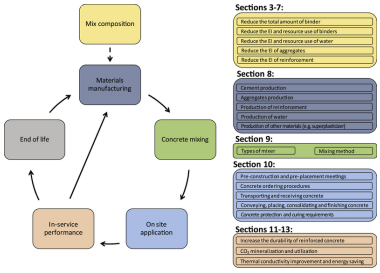
Sustainable Concrete: Innovations for a Greener Future

Concrete production accounts for approximately 7% of global CO_2 emissions, mainly from cement manufacturing.
As demand grows, sustainable methods are necessary to reduce the environmental footprint of concrete.

Self-Healing Concrete

Bacillus bacteria are introduced into concrete to repair cracks by producing calcium carbonate.
Extends the lifespan of concrete structures, reduces the frequency and cost of repairs, and lowers the overall carbon footprint of construction projects.
Jonkers et al. (2010) demonstrated that self-healing concrete can autonomously repair damage and increase sustainability in various applications.





Cleaner Production Techniques

Fly ash, slag, and recycled aggregates are used to replace a portion of cement, reducing CO_2 emissions.
Lowering the amount of clinker (the main source of emissions in cement) helps cut emissions substantially.
Incorporating industrial by-products addresses waste management concerns by recycling materials that would otherwise require disposal.

Energy Efficiency and CO_2 Capture

Latawiec et al. (2018) highlighted the importance of energy-efficient production processes and the use of renewable energy sources.
Technologies such as carbon capture can help further reduce the emissions from cement production.

References
Jonkers, H. M., Thijssen, A., Muyzer, G., Copuroglu, O., & Schlangen, E. (2010). Application of bacteria as self-healing agent for the