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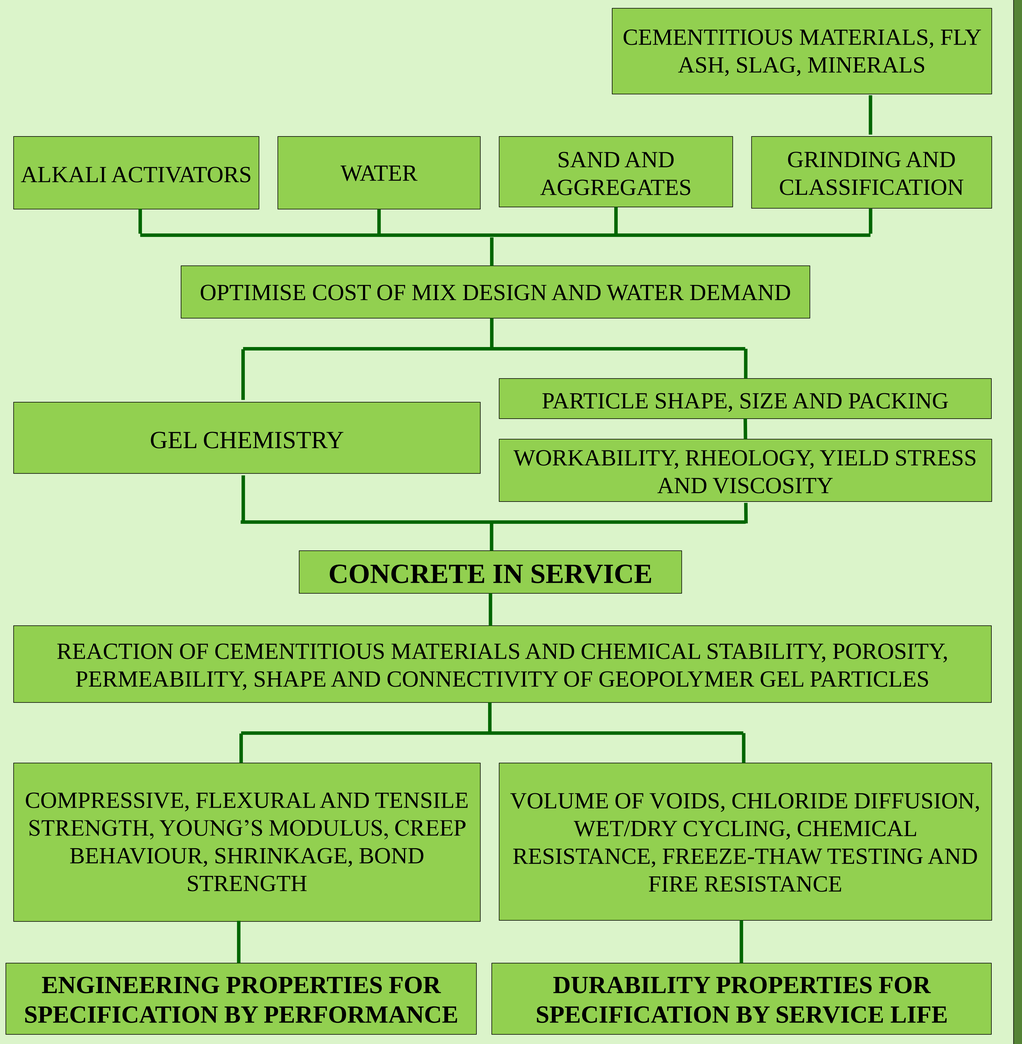
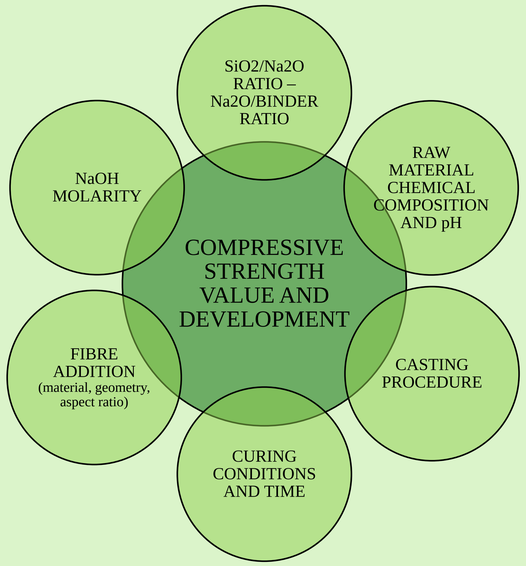
PhD Training Network on **Du**rable, **R**eliable and **S**ustainable Structures with **A**lkali-**A**ctivated **M**aterials

ALKALI-ACTIVATED MATERIALS (AAMs) STRUCTURAL APPLICATIONS

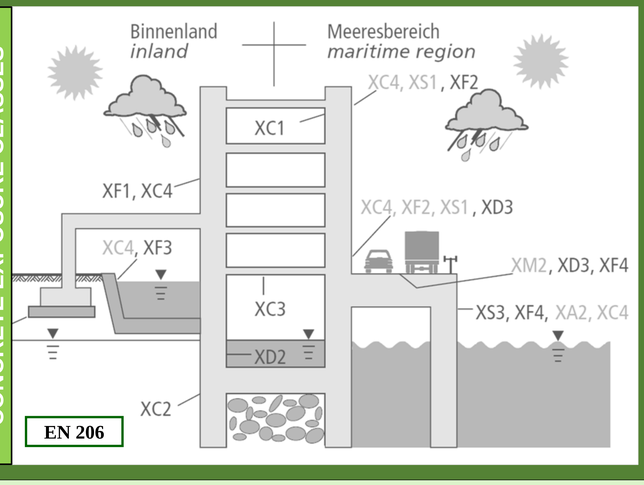
INTERRELASHIONSHIP BETWEEN MIX DESIGN, CHEMISTRY, MATRIX CHARACTERISATION, ENGINEERING AND DURABILITY PROPERTIES



FACTORS AFFECTING AAMs PERFORMANCE



CONCRETE EXPOSURE CLASSES



Expositionsklassen (Umwelteinwirkungen, „Angriffe") *Exposure classes (environmental effects, "attacks")*				Betontechnische Maßnahmen („Widerstände") *Concrete technology measures ("resistances")*		
Klassenbez. *class designation*		Einwirkung und Beanspruchung *effect and stress*		Max. w/z *max. w/c*	Min. z *min. c*	f_{ck}, cube *f_{ck}, cube*
XO		kein Angriff *no attack*	kein Betonangriff *no concrete attack*	keine Anforderung *no requirement*	keine Anforderung *no requirement*	C8/10 *C8/10*
XC	1	H_2O	trocken *dry*	0,75	240	C16/20
	2		ständig nass *constantly wet*	0,75	240	C16/20
	3	CO_2	mäßig feucht *moderately moist*	0,65	260	C20/25
	4	Carbonatisierung *carbonation*	nass / trocken *wet / dry*	0,60	280	C25/30
XD/ XS	1	Cl	mäßig feucht *moderately moist*	0,55	300	C30/37
	2	H_2O	ständig nass *constantly wet*	0,50	320	C35/45
	3	Chlorid *chloride*	nass / trocken *wet / dry*	0,45	320	C35/45
XF	1		mäßige Wassers. o. T. *moderate water saturation (o.T.)*	0,60	280	C25/30
	2		mäßige Wassers. m. T. *moderate water saturation (m.T.)*	0,55 + LP / 0,50	300 / 320	C25/30 / C35/45
	3	Frost /+ Salz *freeze-thaw /+ salt*	hohe Wassers. o. T. *high water saturation (o.T.)*	0,55 + LP / 0,50	300 / 320	C25/30 / C35/45
	4		hohe Wassers. m. T. *high water saturation (m.T.)*	0,50 + LP	320	C30/37
XA	1	Säure *acid*	schwach angreifend *weakly corrosive*	0,60	280	C25/30
	2		mäßig angreifend *moderately corrosive*	0,50	320	C35/45
	3	Chem. Angriff *chemical attack*	stark angreifend *strongly corrosive*	0,45	320	C35/45
XM	1		mäßiger Verschleiß *moderate wear*	0,55	300	C30/37
	2		starker Verschleiß *severe wear*	0,45	320	C35/45
	3	Verschleiß *wear*	sehr starker Verschleiß *very severe wear*	0,45	320	C35/45

APPLICATIONS OF ALKALI-ACTIVATED MATERIALS


1


2


3


4

Images:
1 - Global Change Institute (GCI) – University of Queensland, Australia, 2013, EFC (Earth Friendly Concrete) – Wagners
2 - UrbanEden solar decathlon house – University of Charlotte, USA, 2013, Pre-cast fly ash-based Geopolymer concrete walls
3 -Thomastown Recreation and Aquatic Centre (TRAC) – Victoria, Australia, 2013, Ecrete pre-mixed concrete pavement – Zeobond
4 - Railways sleepers – Melbourne to Sydney mainline, NSW, Australia, Prestressed Geopolymer concrete – Rocla

References:
- van Deventer, J.S.J. et al., Technical and commercial progress in the adoption of geopolymer concrete, Minerals Engineering 29, 89-104, 2012
- Antoni, Wijaya, Hardjito, Factors affecting the setting time of fly ash-based Geopolymer, Materials Science Forum, vol. 841, pp. 90-97, 2016
- Antoni, Satria, Hardjito, Effect of variability of fly ash obtained from the same source on the characteristics of Geopolymer, MATEC Web of Conferences 97, 01026, 2017
- Muhammad et al., Effect of heat curing temperatures on fly ash-based Geopolymer concrete, International Journal of Engineering and Technology, 8 (1.2), 15-19, 2019
- EN 206 – Concrete – Specification, performance, production and conformity