

Concrete with electric arc furnace slags (EAFS) for high added value applications

260 kg/m³ CEM
WIC=0,47

espesor (cm)	Esp. mástico	Flujo I ₀ (n/s)	Desviación	Dosis (mSw/h)	Desviación	I ₀ /I ₀	Error
0	0	9.96E+00	1.04E-02	1.39E-02	1.08E-05	1.00E+00	0.002
1	4.092	8.31E+00	2.21E-02	1.18E-02	3.38E-05	8.35E-01	0.003
3	12.276	6.66E+00	2.67E-02	9.58E-03	3.19E-05	6.69E-01	0.003
5	20.46	5.73E+00	3.83E-02	8.12E-03	4.15E-05	5.78E-01	0.004
15	61.38	3.16E+00	5.95E-02	3.62E-03	4.29E-05	3.17E-01	0.006
30	122.76	1.98E+00	4.62E-02	1.47E-03	2.52E-05	1.99E-01	0.005

espesor (cm)	Esp. Mástico	I ₀ /I ₀ ajustado	Densidad
			4.092

espesor mástico (1)		
n-1	Δ' (cm-2)	err Δ' (cm-2)
04	4.46E-04	9.40E-06
+ Δ'(d·x) ² · e ^{-Σd·x}		
con espesor (2)		
n-1	Δ' (cm-2)	err Δ' (cm-2)
03	7.47E-03	1.57E-04
+ Δ'(x) ² · e ^{-Σx}		





2020


PhD candidate: Pablo Tamayo Castañeda
Supervisors: Carlos Thomas García
Jokin Rico Areñal


Achievement of
competences

COMPETENCIAS B3SICAS	2. Ciencia y T3cnica (estudio bibliogr3fico)	3. Tecnolog3a (herramientas e instrumentos)	4. Actividades Formativas (cursos y seminarios)	5. Resultados (publicaciones)	6. Cr3tica Cient3fica (an3lisis DAFO)	7. Plan de Trabajo	8. Movilidad	9. Financiaci3n	10. 3tica
CB11 - Comprensi3n sistem3tica de un campo de estudio y dominio de las habilidades y m3todos de investigaci3n relacionados con dicho campo.	X	X	X						
CB12 - Capacidad de concebir, dise1ar o crear, poner en pr3ctica y adoptar un proceso sustancial de investigaci3n o creaci3n.				X		X	X		
CB13 - Capacidad para contribuir a la ampliaci3n de las fronteras del conocimiento a trav3s de una investigaci3n original.				X					
CB14 - Capacidad de realizar un an3lisis cr3tico y de evaluaci3n y s3ntesis de ideas nuevas y complejas.					X				
CB15 - Capacidad de comunicaci3n con la comunidad acad3mica y cient3fica y con la sociedad en general acerca de sus 3mbitos de conocimiento en los modos e idiomas de uso habitual en su comunidad cient3fica internacional.				X			X		
CB16 - Capacidad de fomentar, en contextos acad3micos y profesionales, el avance cient3fico, tecnol3gico, social, art3stico o cultural dentro de una sociedad basada en el conocimiento.				X					X

 **Formaci3n transversal obligatoria:** todo doctorando debe superar las 80 horas de formaci3n transversal organizadas por la EDUC en 2 cursos a realizar al inicio (Curso B3sico) y al final del doctorado (Curso Avanzado). Toda la informaci3n al respecto est3 disponible en: <http://www.doctoradouniversidadcantabria.com/content/actividades-transversales>

 **Evaluaci3n favorable de su PI anual a lo largo de todo el doctorado:** la importancia del PI y su evaluaci3n es cr3tica al depender directamente de 3l la adquisici3n de las competencias CB11 y CB14 y las capacidades y destrezas personales CA01, CA03 y CA06, directamente relacionadas con sus apartados 2, 3, 4, 6, 7 y 9.

 **Publicaciones cient3ficas internacionales:** la publicaci3n de los resultados obtenidos en art3culos de investigaci3n en revistas cient3ficas internacionales permite al doctorando asegurar la adquisici3n de las competencias CB12, CB13, CB15 y CB16 y la capacidad y destreza personal CA02.

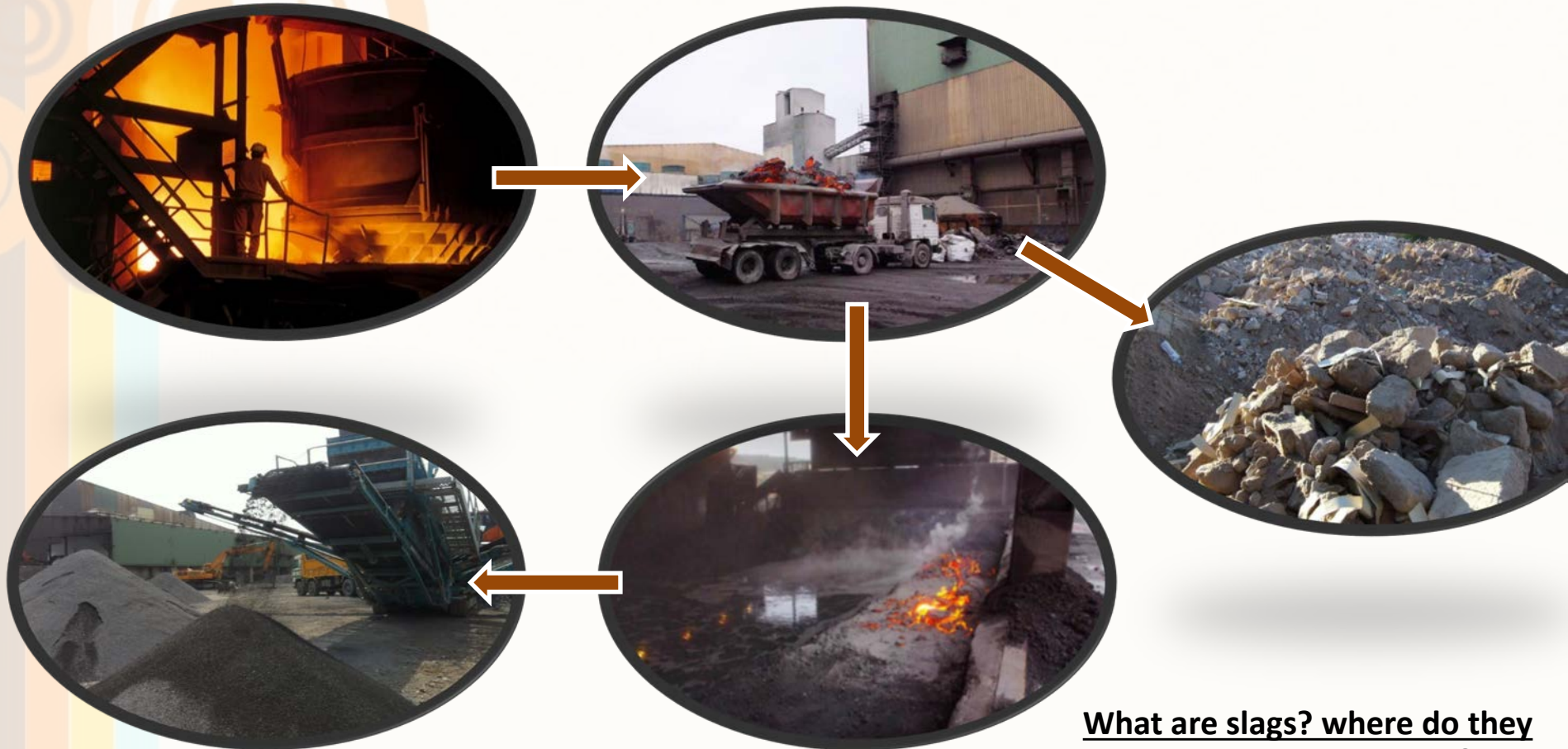
 **Movilidad internacional:** esta condici3n es clave para obtener la capacidad y destreza personal CA04, completando la formaci3n del doctorando.

Research
progress

Research
completed

Research in
progress

Objective: demonstrate the feasibility of recycled concrete steel with slags



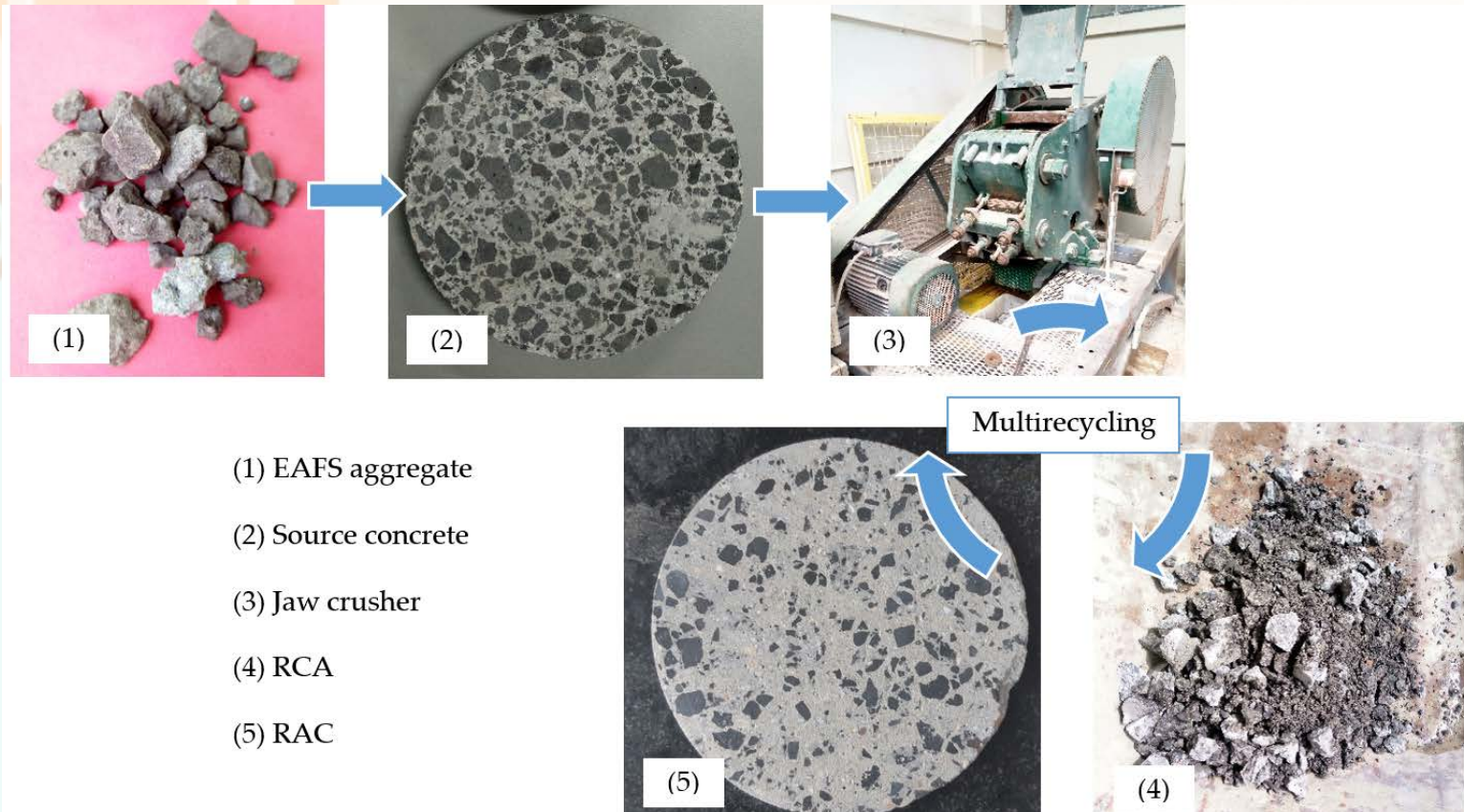
What are slags? where do they come from? where are they going to?

Research
progress

Research
completed

Research in
progress

Concrete with electric arc furnace slags (EAFS)



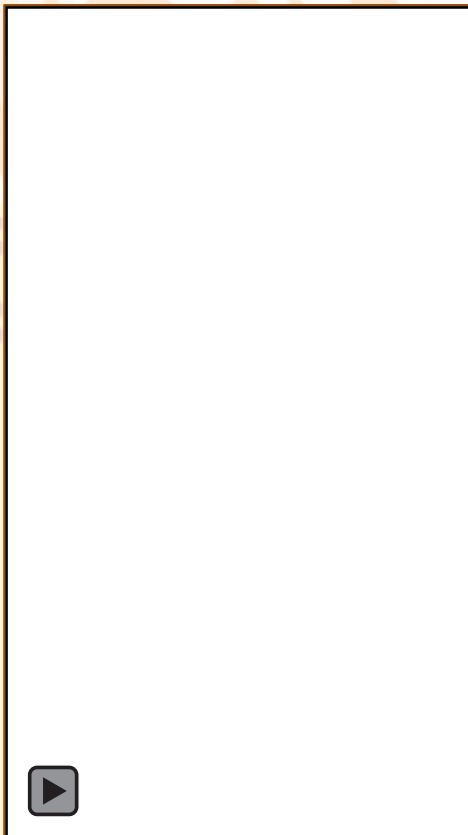
Recycled aggregate concrete (RAC) manufacturing process

Research
progress

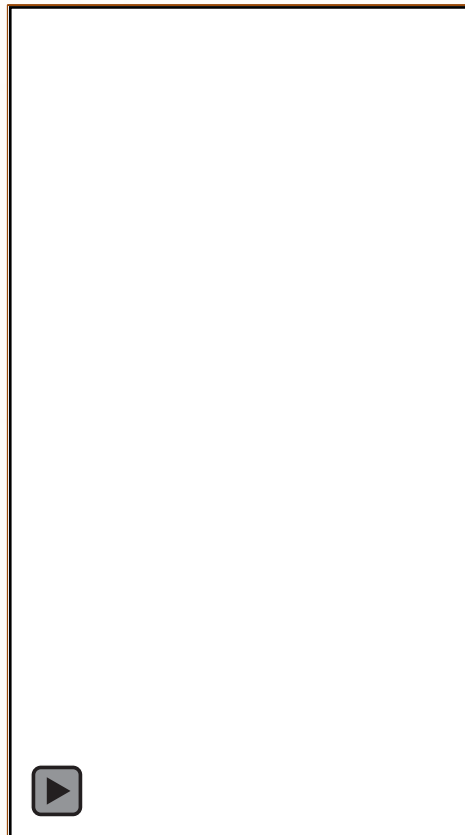
Research
completed

Research in
progress

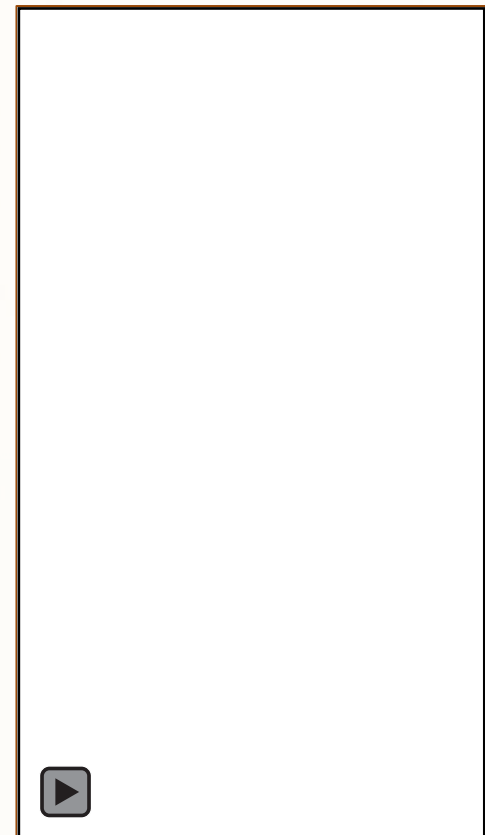
Manufacture of the concrete



Concrete mixing.



Workability test.



Unmoulding.

Research
progress

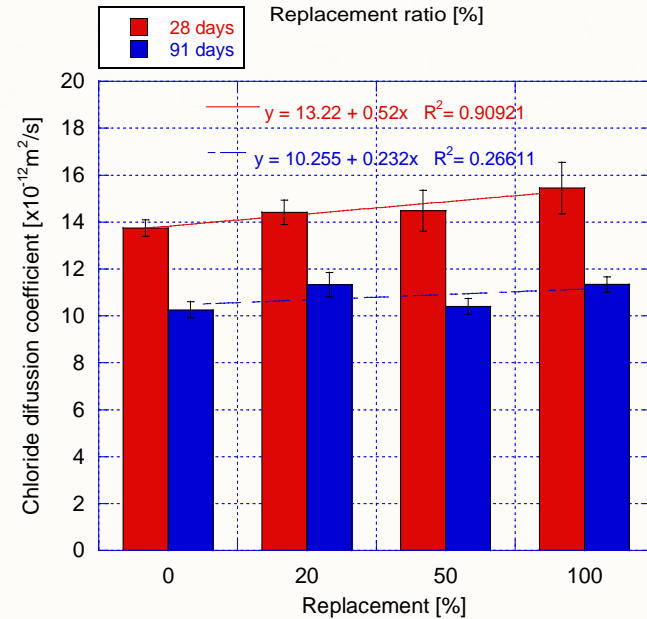
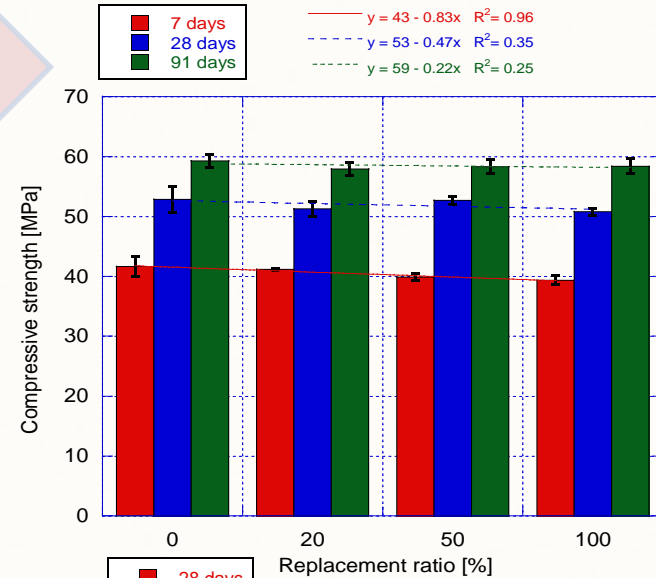
Research
completed

Research in
progress

Some tests and results



Some of the tests performed to characterize the RAC

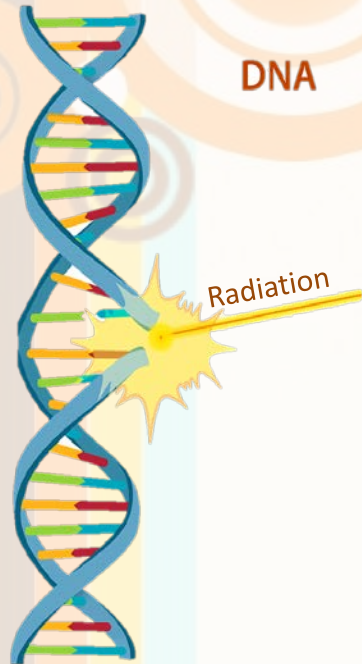


Research
progress

Research
completed

Research in
progress

Objective: demonstrate feasibility of EAFS for radiation shielding



Radiation shielding in concrete

Ionizing radiation

Gamma rays

Attenuated by

High density
materials

Provided by

Iron
aggregates



Neutrons

Attenuated by

Light nuclei
(H) materials

Provided by

Hydrated
cement

Both cannot be maximized

Why don't we investigate the
feasibility of EAFS?

LET'S DO BOTH!

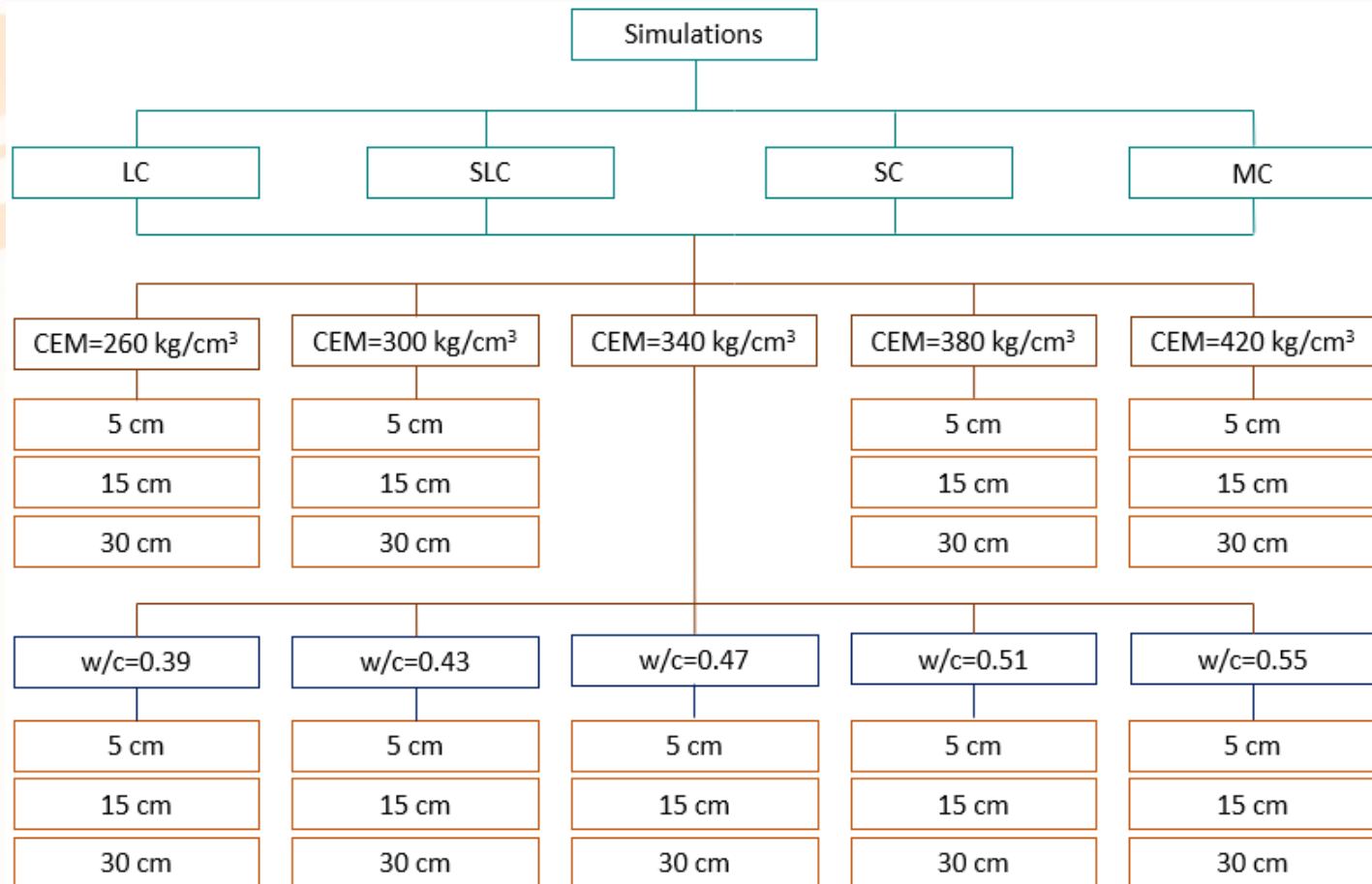
Why don't we investigate the
effect of cement and
water/cement ratio?

Research
progress

Research
completed

Research in
progress

Effect of aggregates, cement and w/c ratio on radiation shielding: Simulations

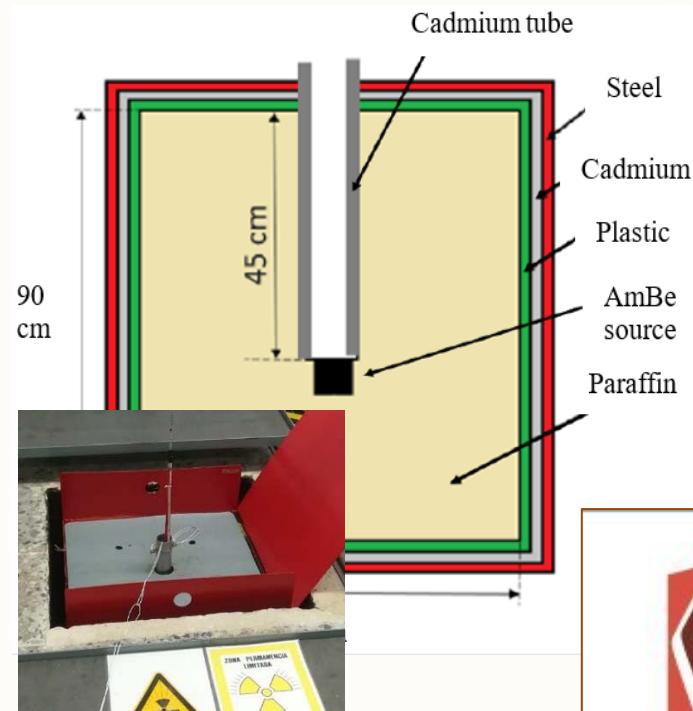
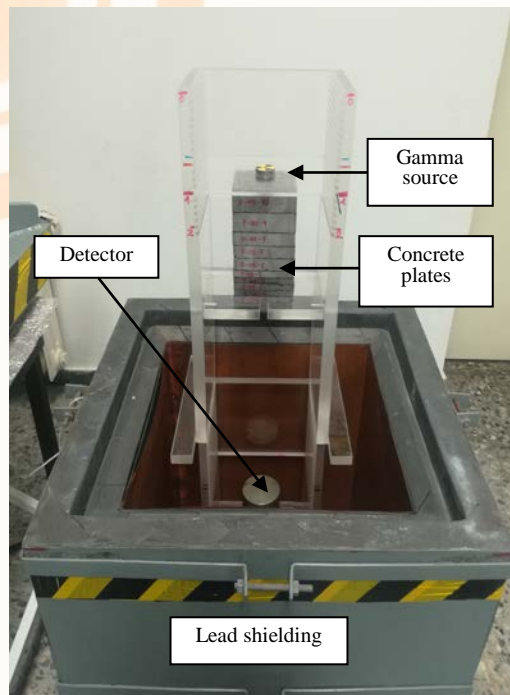


Research
progress

Research
completed

Research in
progress

Effect of aggregates, cement and w/c ratio on radiation shielding: Validation



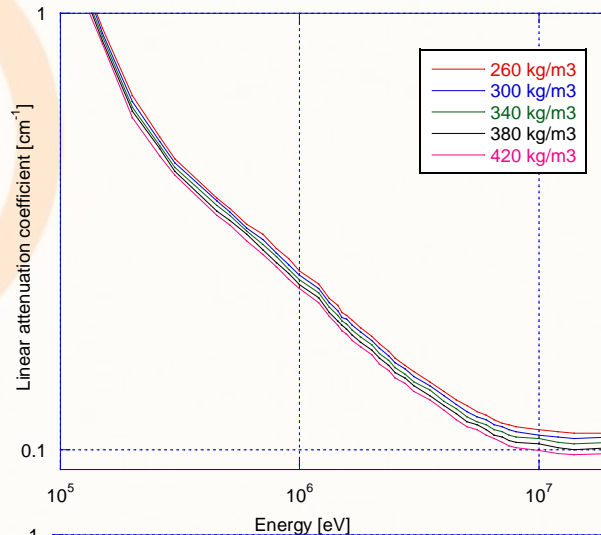
Experimental set-up for gamma (left) and neutron (right) radioactive testing.

Research
progress

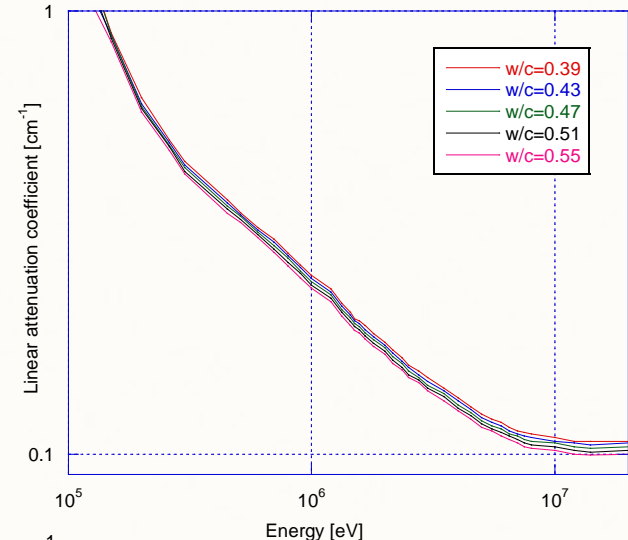
Research
completed

Research
in progress

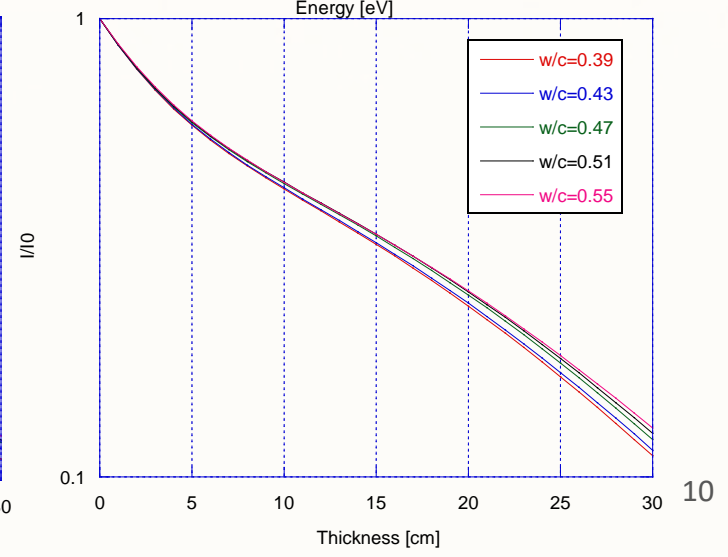
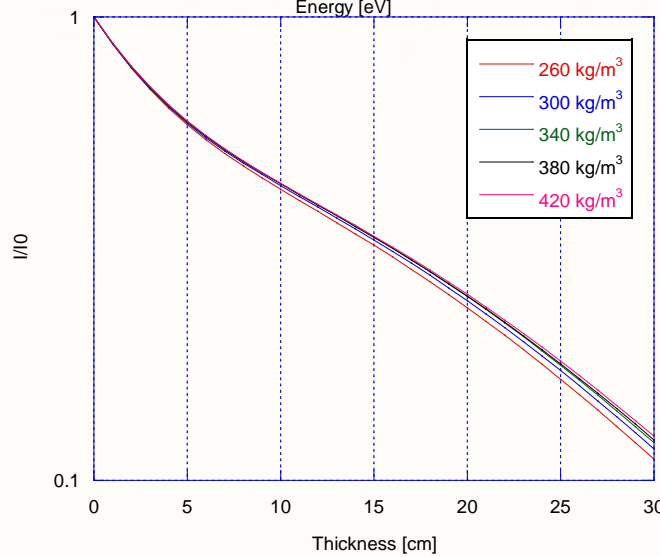
Gamma shielding



Magnetite concrete (MC)



Neutron shielding



Expected thesis
submission date

OCTOBER 2020

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	





Thank you for your attention