Title: "Imaging the hydration of low-carbon CEMents with SYNchrotron X-rays" Acronym: syn4cem

I tried: call 2019 – B, PE8. Call 2021 – B, PE11. Call 2023 (May) – PE11, retained

PANEL SCORE AND RANKING RANGE

Final panel score: B (is of high quality but not sufficient to	Ranking range	: 36%-45%	
pass to Step 2 of the evaluation. Please note that you may also be subject to resubmission limitations in the next call)	For your information, only the evaluated in panel PE8 we	e top 25% of the ere retained for	proposals Step 2.

* Ranking range of your proposal out of the proposals evaluated by the panel in Step 1, in percent, from 1% for the highest ranked proposals to 100% for the lowest ranked.

PANEL SCORE AND RANKING RANGE

Final panel score:	B (is of high quality but not sufficient to pass to Step 2 of the evaluation. Please note that you may also be subject to resubmission limitations in the next call)	Ranking range For your information, only the evaluated in panel PE11 w	top 34% of the vere retained for	proposals Step 2.

* Ranking range of your proposal out of the proposals evaluated by the panel in Step 1, in percent, from 1% for the highest ranked proposals to 100% for the lowest ranked.

What has changed in the 2023 proposal?

nature communications

Article

https://doi.org/10.1038/s41467-023-38380-1

4D nanoimaging of early age cement hydration

Received: 18 November 2022	 Shiva Shirani ¹, Ana Cuesta¹, Alejandro Morales-Cantero ¹, Isabel Santacruz¹, Ana Diaz ², Pavel Trtik ³, Mirko Holler ², Alexander Rack ⁴, Bratislav Lukic⁴ Emmanuel Brun⁵, Inés R. Salcedo ⁶ & Miguel A. G. Aranda ¹ 		
Accepted: 26 April 2023			
Published online: 08 May 2023			
Check for updates	Despite a century of research, our understanding of cement dissolution and precipitation processes at early ages is very limited. This is due to the lack of methods that can image these processes with enough spatial resolution		

The key idea of this ERC-AdG proposal is/was:

to develop 4D synchrotron X-ray nanoimaging with higher spatial and temporal resolutions (technical development) to mechanistically understand early-age cement hydration (fundamental scientific problem/challenge) in order to enhance the mechanical strengths at one day of hydration of low carbon cements (societal need) Without this key paper, I don't think that I could make it to step 2: the first 4D X-ray nanoimaging study of cement hydration.

Feasibility vs. ground-braking: one very good paper (several is a problem)

I received the email in late November-2023 and then I was called to a 5 min (300 sec) pitch followed by 20 min of Q&A on 2024/02/06

Thus, I had to prepare: (i) 5-min the pitch, & (ii) the 20-minute interview

I took it very seriously as I had waited more than eight years for this chance I submitted the first proposal in 2019, but I wrote a review article in 2016 about synchrotron and cements, to start preparing this AdG But, what does it mean to take it very seriously?

I almost stop my research in December-2023 and January-2024

I dedicated more than 30 full working days (300 h) to prepare the 300 s pitch and more than 5 d to prepare the Q&A

THE PITCH

I finished the first version of the 300-sec seminar by early-December and I shared it with my collaborators and some friends

Estefania's (FECYT) feedback on 2023/12/18:

"...Como queda mucho tiempo me permito ser muy sincera, espero que lo interpretes como algo positivo y no una crítica personal. Empieza de nuevo la presentación por entero. Tienes que cambiar completamente el enfoque...." *I did not take it personally and she was right*

1. I *simplified* the pitch and I did two seminars with international collaborators from Switzerland and Italy (late December and early January). I took their advice. I produced *very appealing* figures

2. I did "Simulacro entrevista ERC Fecyt 01/2024" with two ERC experts found by FECYT. My opinion: Quite helpful. Both the pitch and the questions I keep changing the pitch

3. I did "Simulacro entrevista ERC Fecyt 23/01/2024" with Kveloce with the help of FECYT. My opinion: Helpful but not much. I keep changing the pitch

4. Finally, I was advised to hire Matt Boardman as personal coach for the ERC interview. UMA give me a funding 1.5 k€ for two training sessions My opinion: Extremely Helpful.
I changed the pitch a lot (last week of January). My essays: ≈296 seconds.

MY PITCH (for 5 minutes)

- **12 slides.** But very simple (with little text and appealing figures)
- Well-thought connections between one slide and the following
- Using (not abusing) ERC codewords: ground-breaking, feasible, risk,
- Always using first person: "my hypothesis"
- **Counterbalance:** fundamental & applied
- As clear as possible
- If you have doubt (to include it or not), easy: delete it
- I had a second PC, a person from IT outside, in case of technical issue(s). *Nothing was need but I was confident that everything was under control*

EXAMPLES (from my pitch)

Appealing images (1st slide no title) just showing the idea

Appealing start

syn4cem Miguel A. G. Aranda







Appealing images (last slide no text) Impacts of syn4cem



@ mesoscale

@ macroscale



Miguel A. G. Aranda







All icons from www.flaticon.es

My ground-breaking idea: to use 4D nanoimaging to improve LoCC performances

Examples of ERC code-words Examples of simple icons

Hence, **syn4cem** has two pillars:





#1. Technique development,fast high-resolution 4D nanoimaging

#2. Admixture development, synergy between C-S-H seeding and alkanolamine (for instance TIPA: triisopropanolamine)

Fully embedded with the European 'Green Deal'

My newest experiment 3D High-Resolution near-field ptychotomography

15µm (vertical)

50



180µm (horizontal)

0

Project.: 2400

-50

t=1860 min



If anyone wants my full seminar **<u>confidentially</u>**, send me an email (<u>g_aranda@uma.es</u>) and I will email it to you

(I got confidentially, ERC seminars from friends!)

Backup slides					
Fig 1 - B1	Fig 2	2 - B1	Fig 3 - B	51	Fig 4 - B1
Table 1 - B2	Table 2 - B2	Tab	ole 3 - B2	Fig 1 - B2	Fig 2 - B2
Fig 3 & 4 - B2 Fig	g 5 - B2 Fig	g 6 - B2	Fig 7 - B2	Fig 8 - B2	Fig 9 & 10 - B2
Fig 11 - B2	Fig 12 – B2		Risk analysis - B2	2	Objectives - B2
Highlights 4D nanoimagingImpact 4D nanoimagingPreparatory HR nf-PnCT					
fast nf-PnCT Pl	nase vs. absorpt	ion in ptych	o Preparato	ory nf-PnCT e	periment LoCC
Preparatory nf-PnCT with admixtures Cement hydration synchrotron & cements				tron & cements	
admixtures's role	Key descript	ors Nan	oimaging to acc	eleration	Key deliverables

Questions and answers: I prepared more than 60 Q&A

ERC-AdG 2023 call --- syn4cem --- 2024/02/06¶

Questions and Answers from the panel

1. Chair of the panel: Which is the most risky/challenging part of the project?

The tomograms have to be taken very fast and therefore they will be quite noisy. Thus, denoising the reconstructions by machine learning tools. I have little experience in this subfield and this is why I am starting a collaboration with **Joost Batenburg** (from University of Leiden) starting with the program Noise 2 Inverse. A backup slide used: fast-HR-nf-PnCT.

I was able to answer 12 questions in 20 minutes. My understanding is that more than 7/8 is required to be confident of a satisfactory output.

I had prepared only 2 out of the 12 questions. 10 were very specific of my research project.

- They were taken from the reviewer's reports. ESR.
- I have #10: 4 general and 6 very specific (cement and synchrotron experts).

There were no questions about me, the budget, leadership, competitors, world context, etc...

Additional tips

Be relaxed (you are the expert but they have to make a very difficult decision)

Answer calmly (independent of the nature of the question).

Relaxing (grey-component) color for the text in the presentation

Hope it helps a bit

