

**PHOTOCATALYTIC CONCRETE**

**SOLUTION OF THE FUTURE IN FIGHTING OF THE  
ATMOSPHERIC POLLUTION**

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## Summary

The current study is focused on the development of a photocatalytic concrete composition for non-structural elements, such as border stones and pavements, for high traffic polluted areas. The main benefit of the photocatalytic concrete is the ability to reduce and neutralize exhaustion gases, with clear benefits on human's health. The optimum composition was developed with the variation of the water/binder ratio, aggregate size, cement content and titanium dioxide addition. Basic testing of the neutralizing capacity was also performed.

The results show that photocatalysis can take place in concrete at early ages, however, long-term testing and aggressive environmental exposures should also be performed.

## Objectives

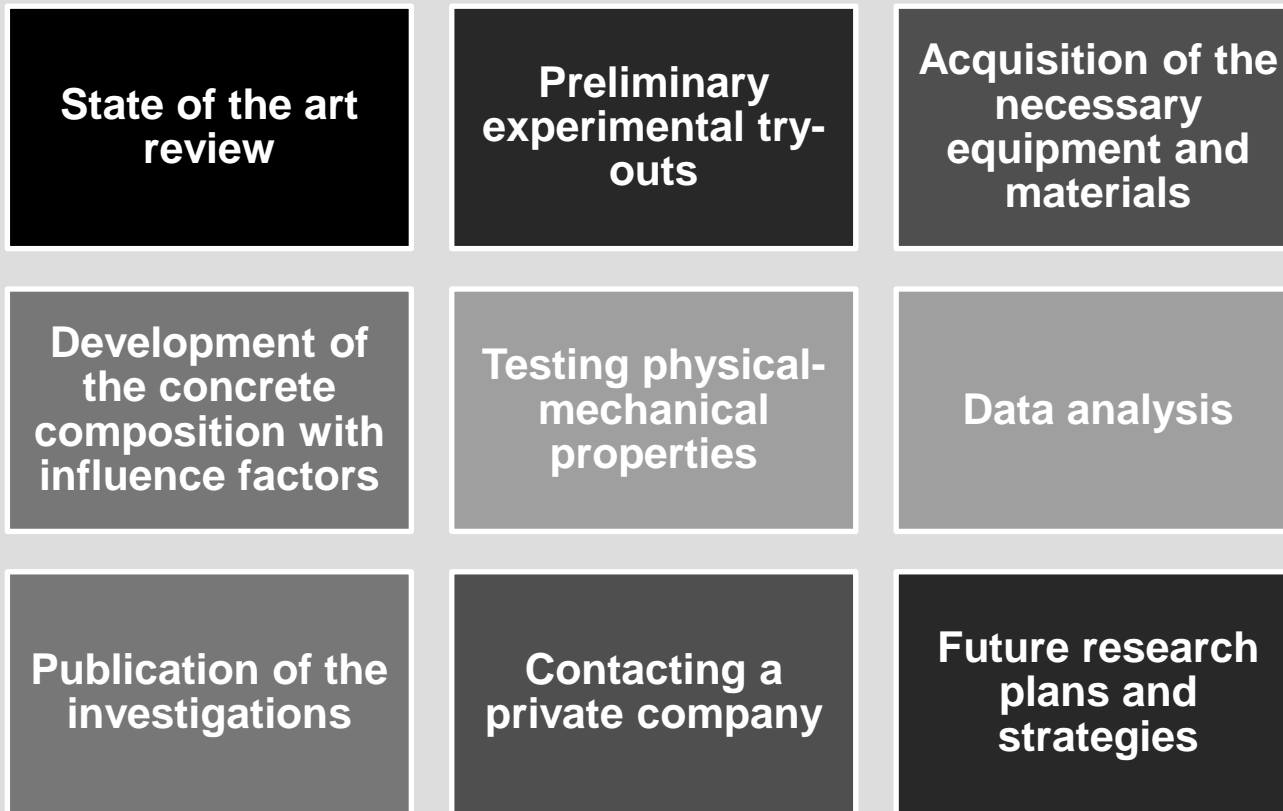
TiO<sub>2</sub>

**PHOTOCATALYTIC  
concrete  
composition**

- High-strength concrete
- Optimum cement content
- Optimum porosity



## Activities



## Milestones

State of the art review

Development of the concrete composition with influence factors

Testing and data analysis

Publication

## Challenges

Design and acquisition of the experimental set-up

- Sensitive components
- Gas proof recipient

Administrative procedures

- Special forms
- Special procedures

## Results

# 24 Concrete Compositions

**Water/Binder**

-0.430

- 0.464

**Maximum  
aggregate size**

- 4 mm

- 8 mm

**Cement content**

- 306 kg/cm

- 360 kg/cm

**TiO<sub>2</sub> content**

-0%

-5%

- 8%

**by weight of  
cement**

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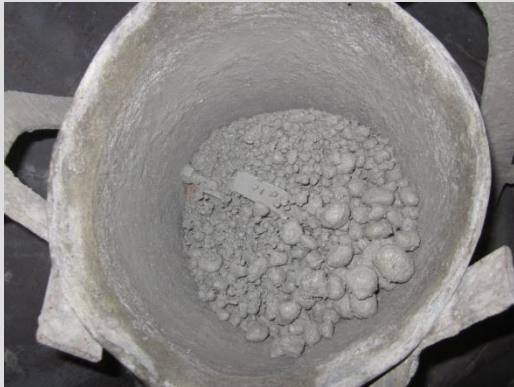
## Results

	W/B= 0.464 Binder 340.00						W/B= 0.43 Binder 340.00					
ID	F1	F2	F3	F4	F5	F6	R1	R2	R3	R4	R5	R6
TiO2 (%)	0.00	0.00	5.00	5.00	8.00	8.00	0.00	0.00	5.00	5.00	8.00	8.00

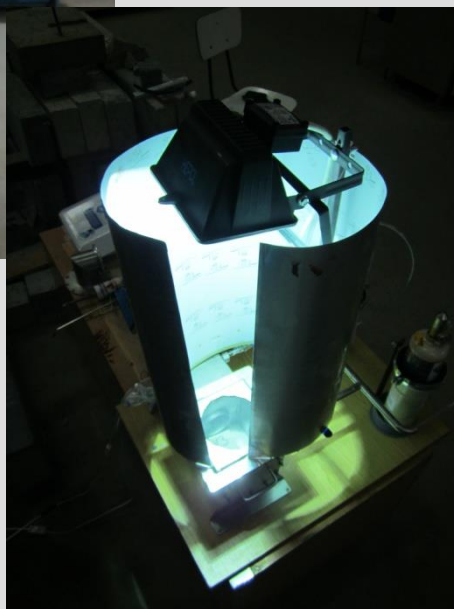
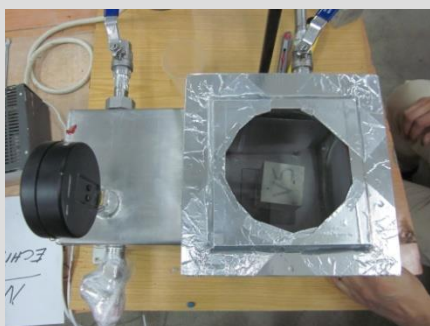
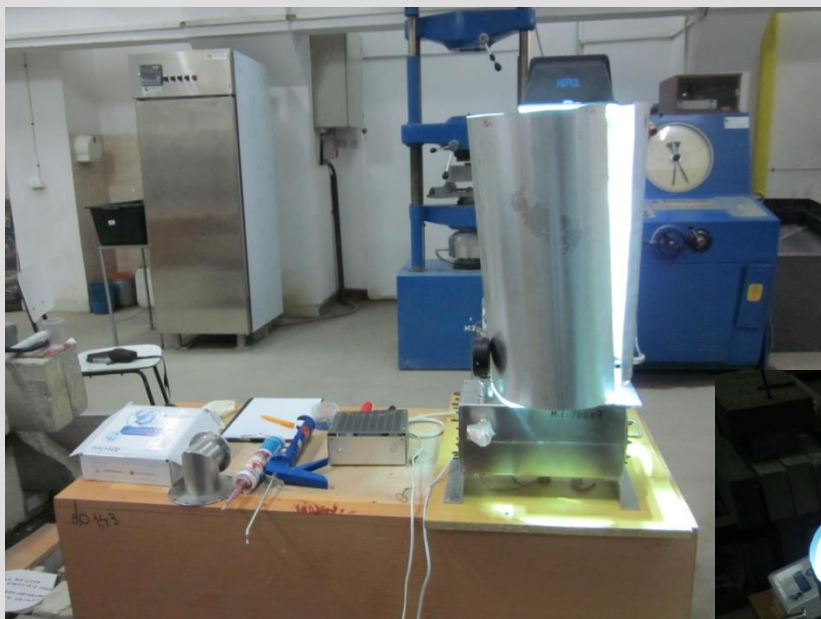
	W/B= 0.464 Binder 400.00						W/B= 0.43 Binder 400.00					
ID	T1	T2	T3	T4	T5	T6	V1	V2	V3	V4	V5	V6
TiO2 (%)	0.00	0.00	5.00	5.00	8.00	8.00	0.00	0.00	5.00	5.00	8.00	8.00



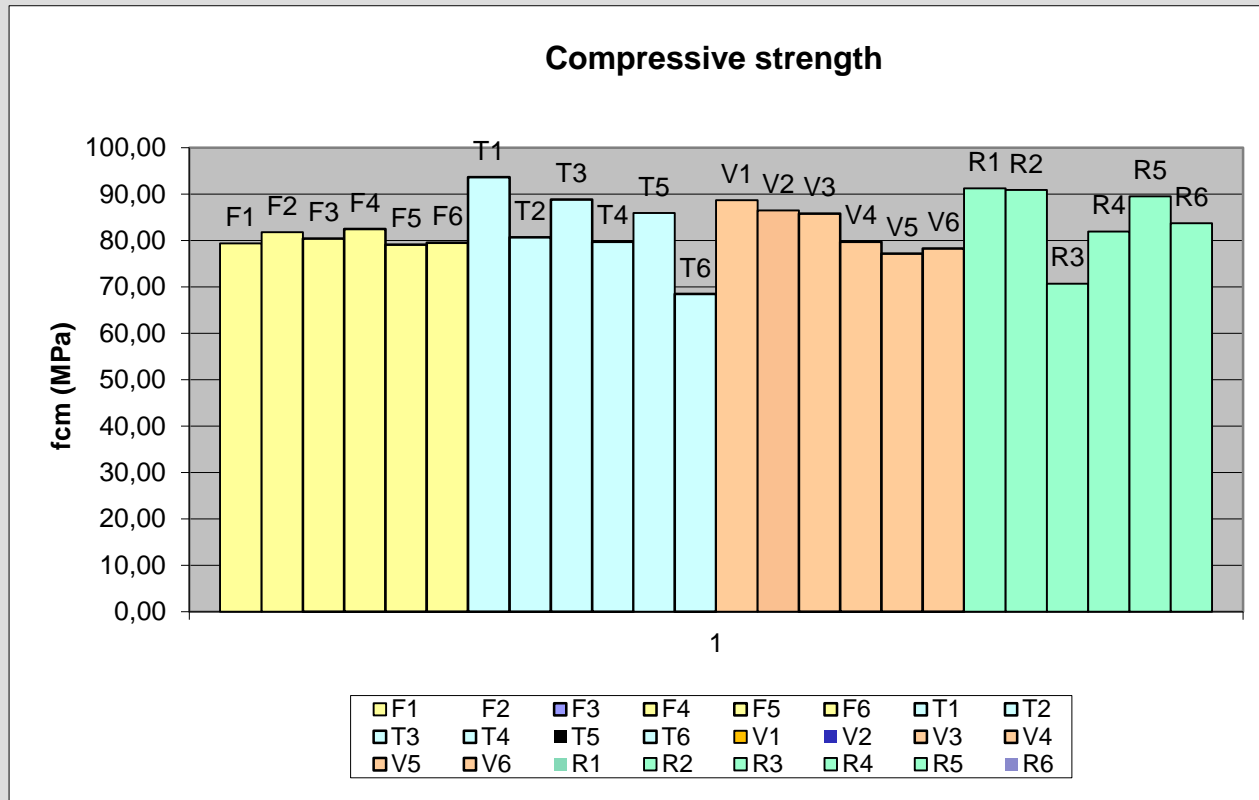
## Results – casting the specimens



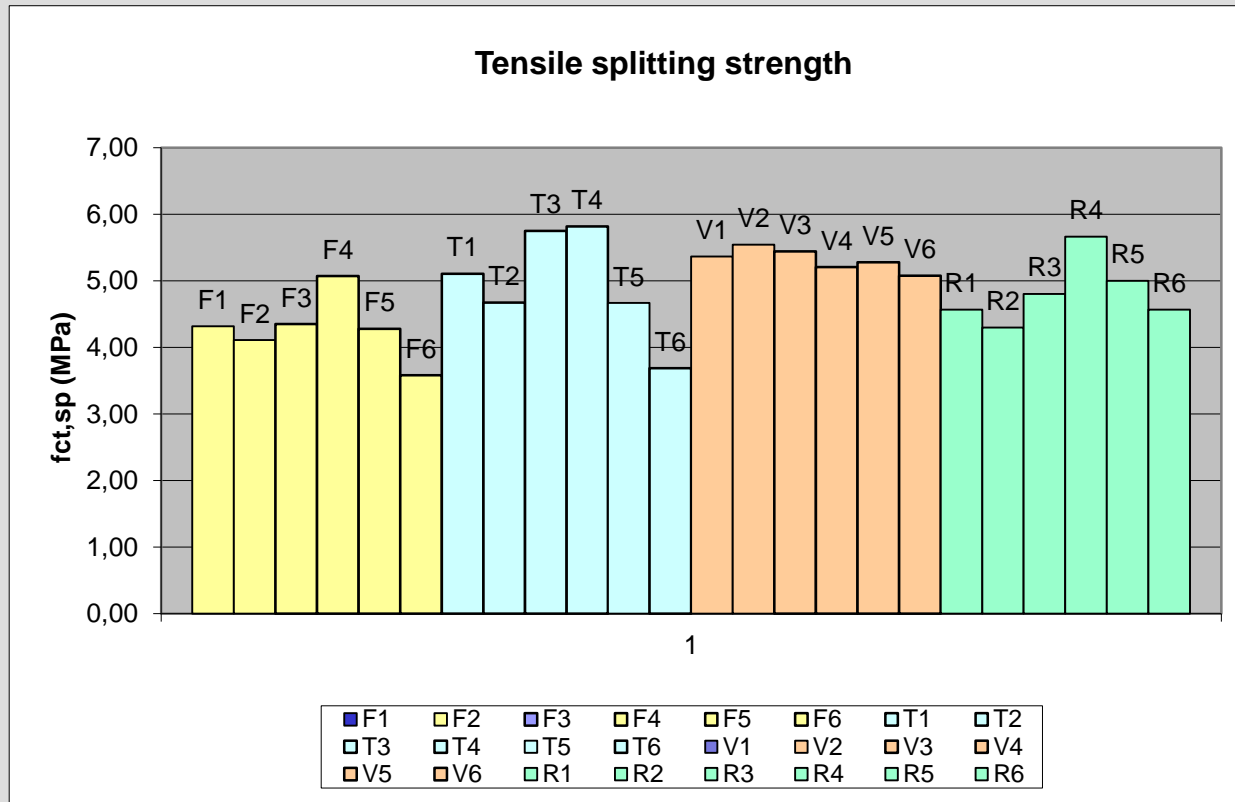
## Results – testing the photocatalysis



## Results – Concrete compressive strength $f_c$ (MPa)

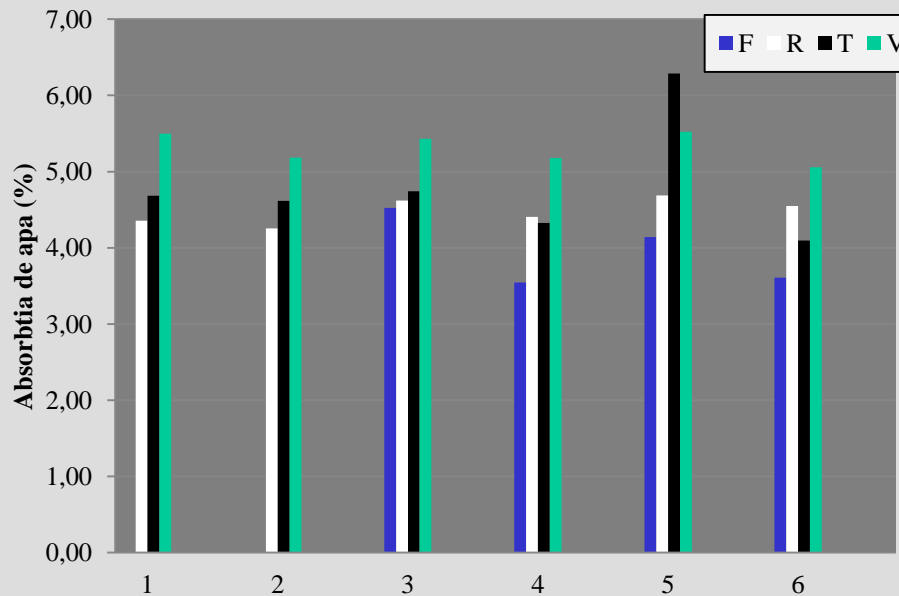


## Results – Concrete splitting strength $f_{ct,sp}$ (MPa)

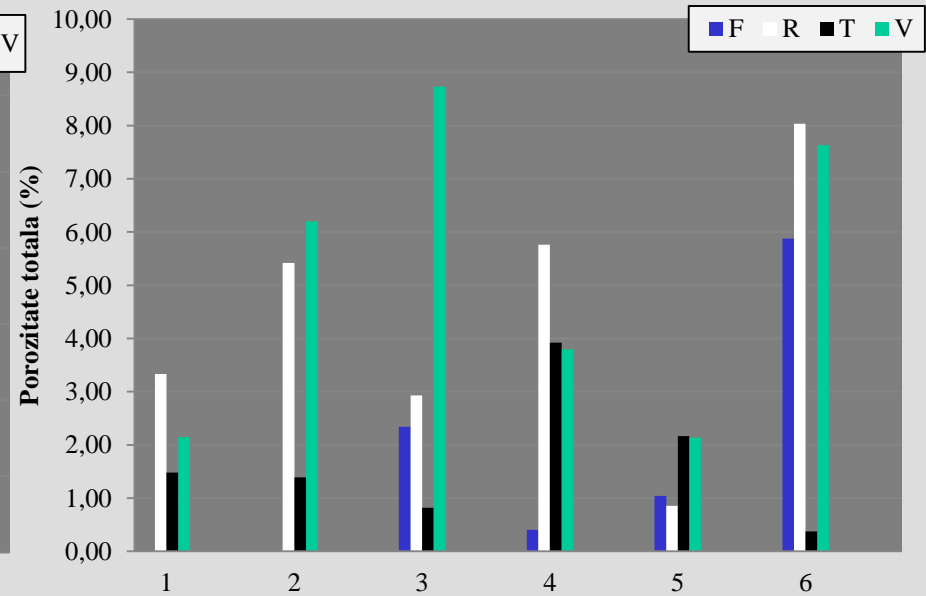


## Results – Concrete Porosity and Water Absorption

### Water absorption (%)



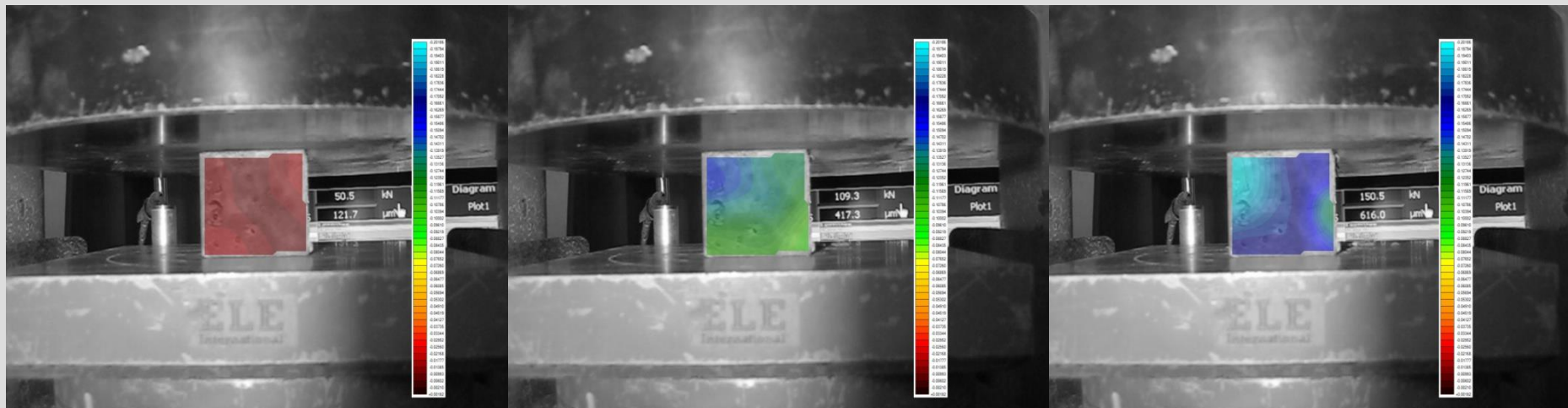
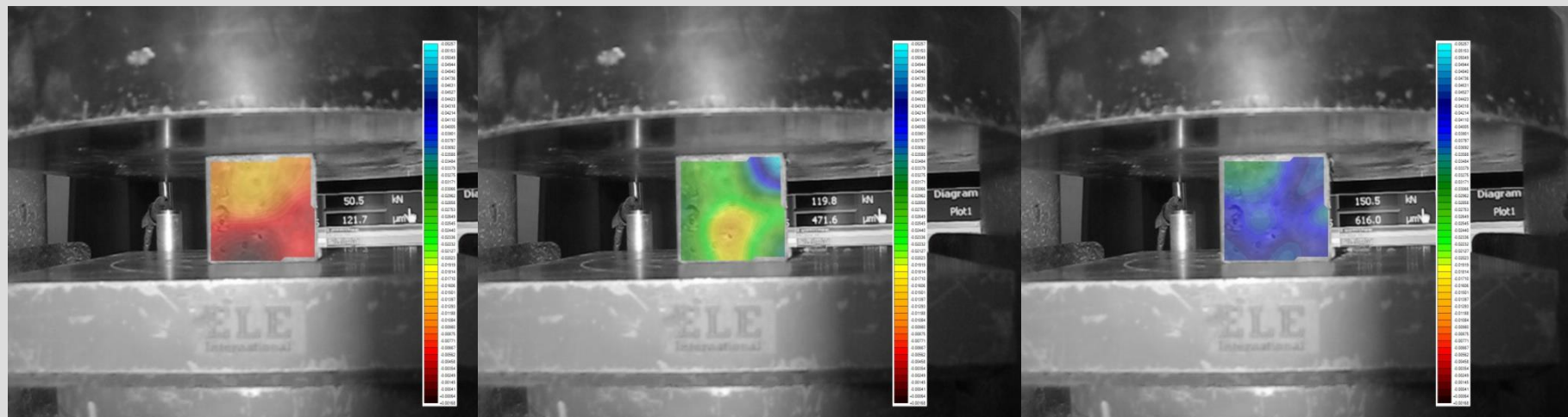
### Total porosity (%)



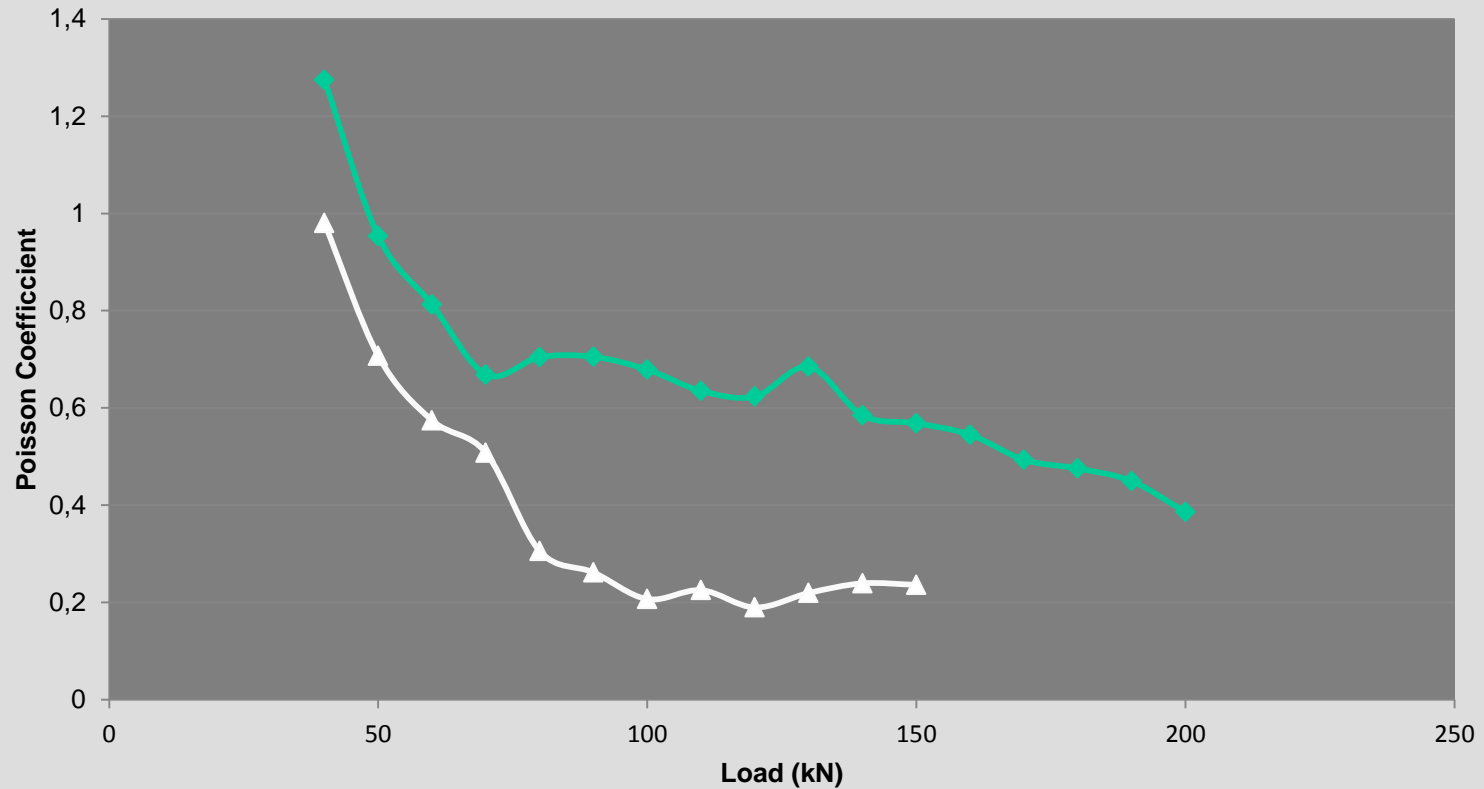


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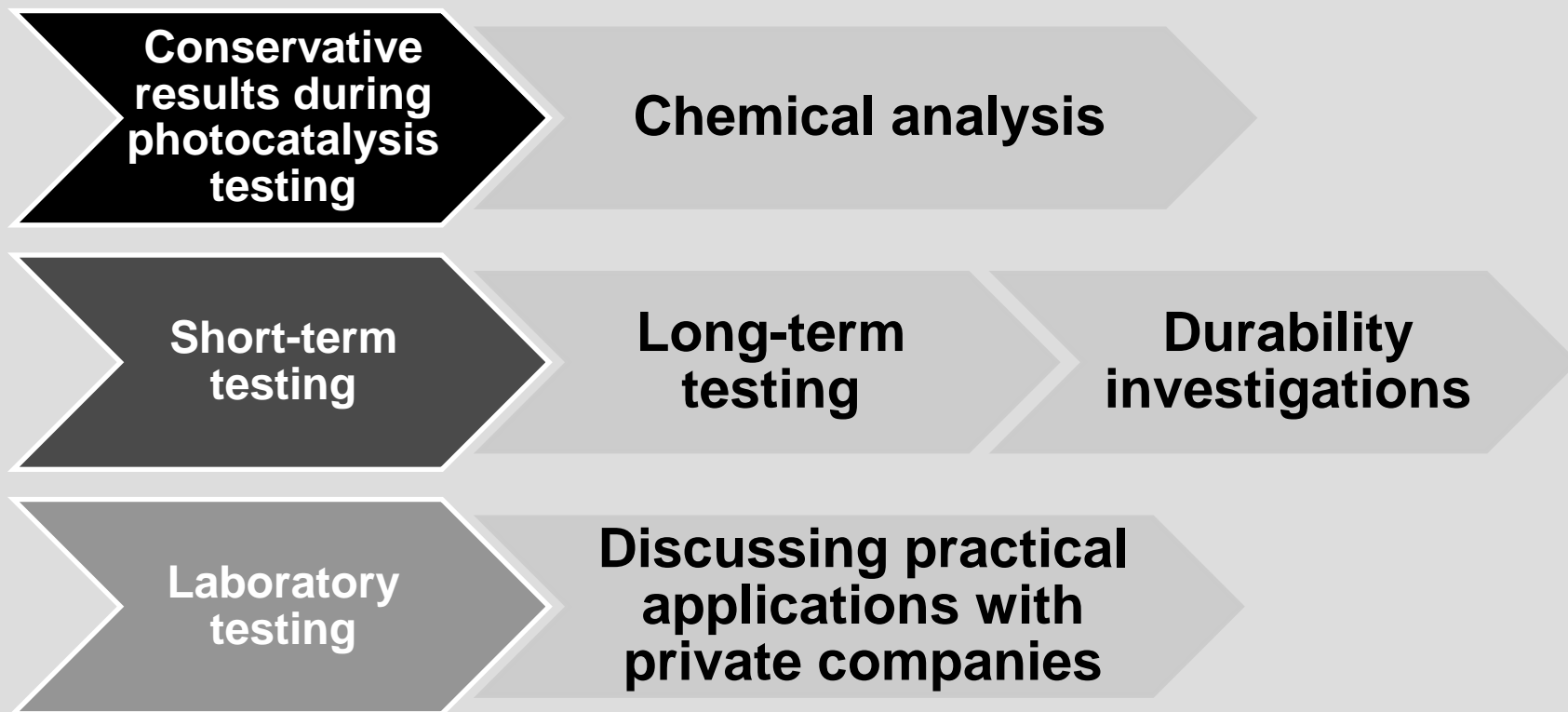
## Results – Optical measurements- x/y measurements



## Results – Concrete Poisson Coefficient



## Next steps





## Thank you for your attention

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