



Railway noise barriers made of eco-friendly materials

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Outline

Introduction

Materials

Structure
selection

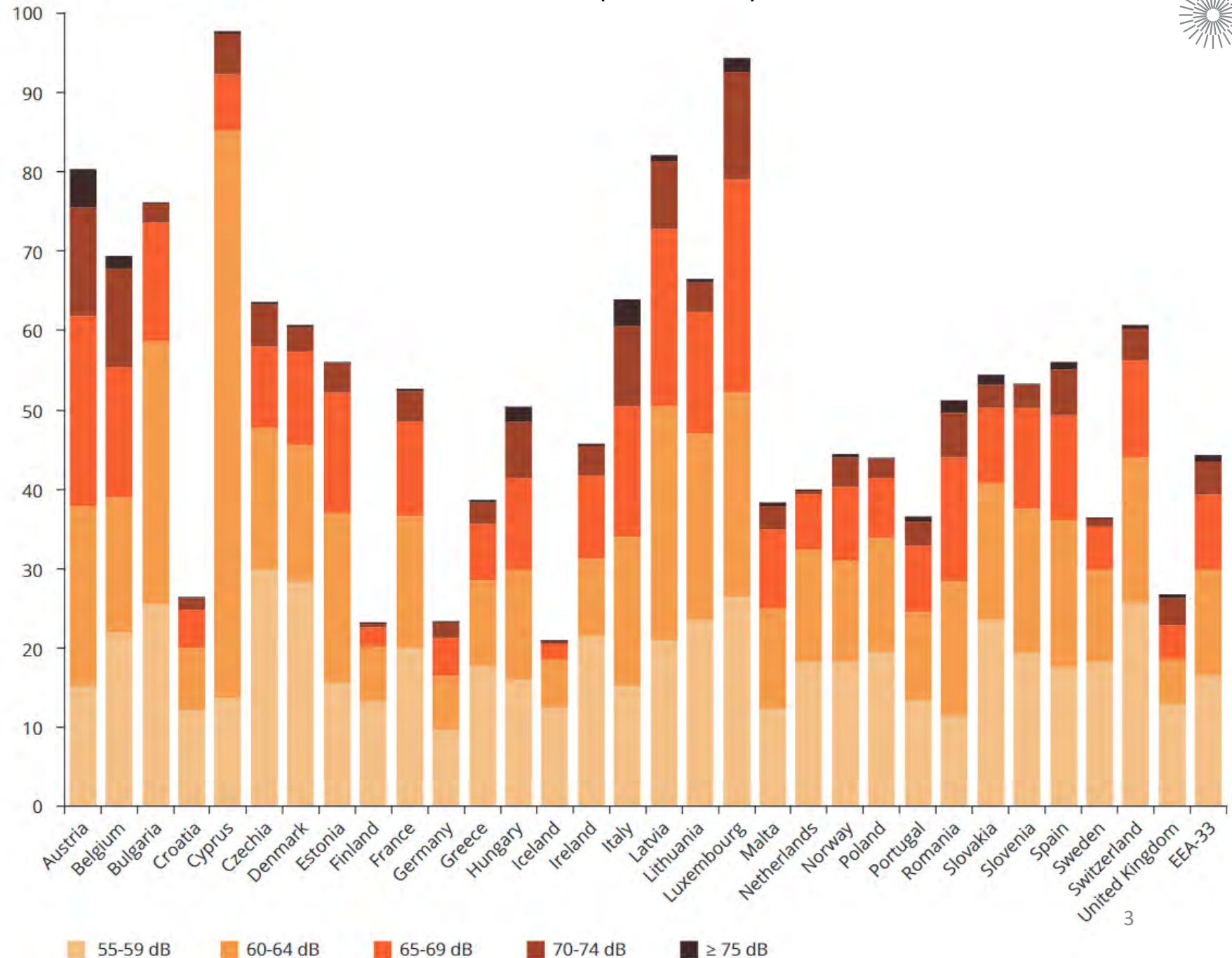
Milestones

Noise pollution in Europe

- Noise pollution is the second greatest environmental and health hazard.
- It causes **30 million** cases of premature deaths, ischemic heart disease, chronic annoyance, sleep disturbance.

Percentage of inhabitants

Source: <https://ec.europa.eu/>





Noise barrier systems

1. Reflective:

- smooth and hard surface.
- reflect the incoming sounds.
- simple but low noise blocking efficiency.

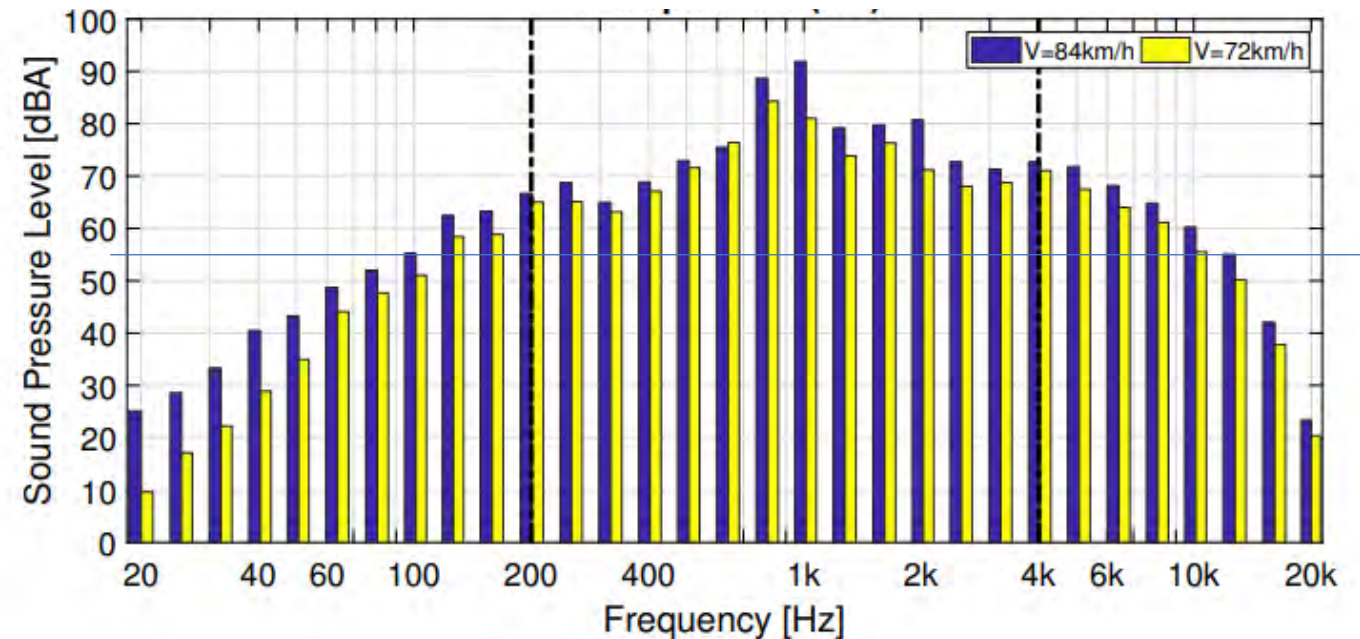




Noise barrier systems

2. Absorptive:

- holes or slits on surface.
- filled with soundproofing material.
- high efficiency.



Sound pressure level at a distance of 4.5 meter from the railway (*Lazaro et. al., 2016*)



Project on railway noise barrier using eco-friendly materials



- Using greener materials, wastes.
- Significant lighter, longer lifespan.
- At least 30% cheaper.
- Great performance.



Materials

Geopolymers (potassium water glass and metakaolin based).

3M glass bubble.

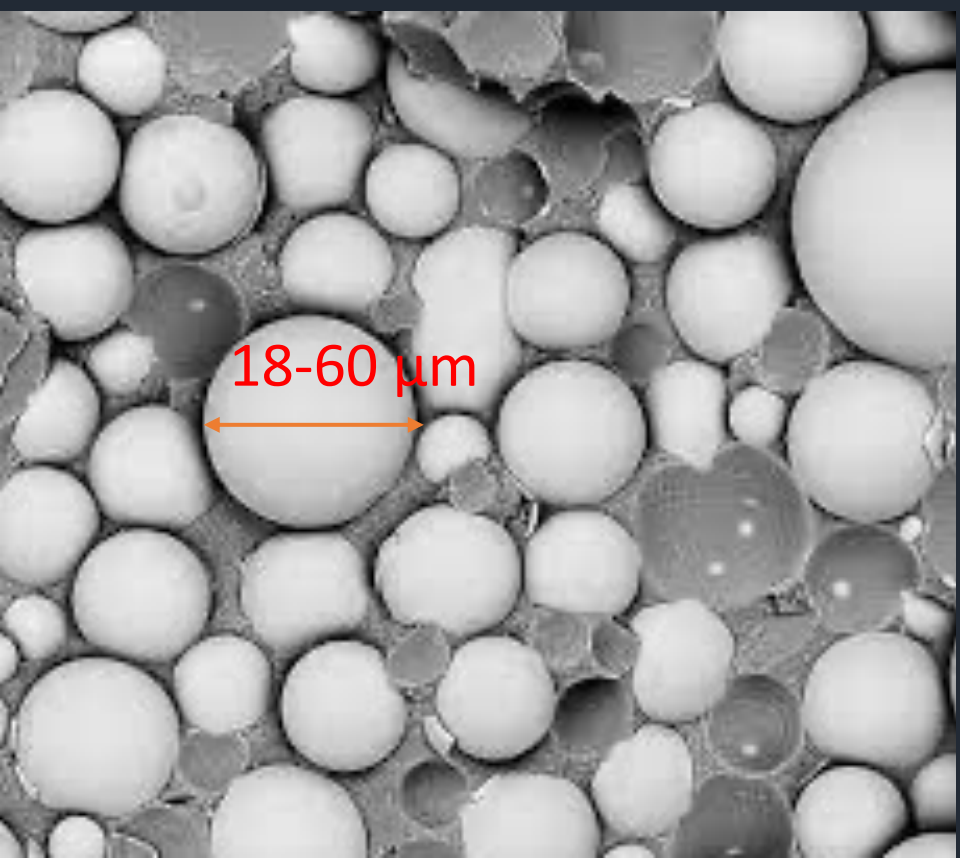
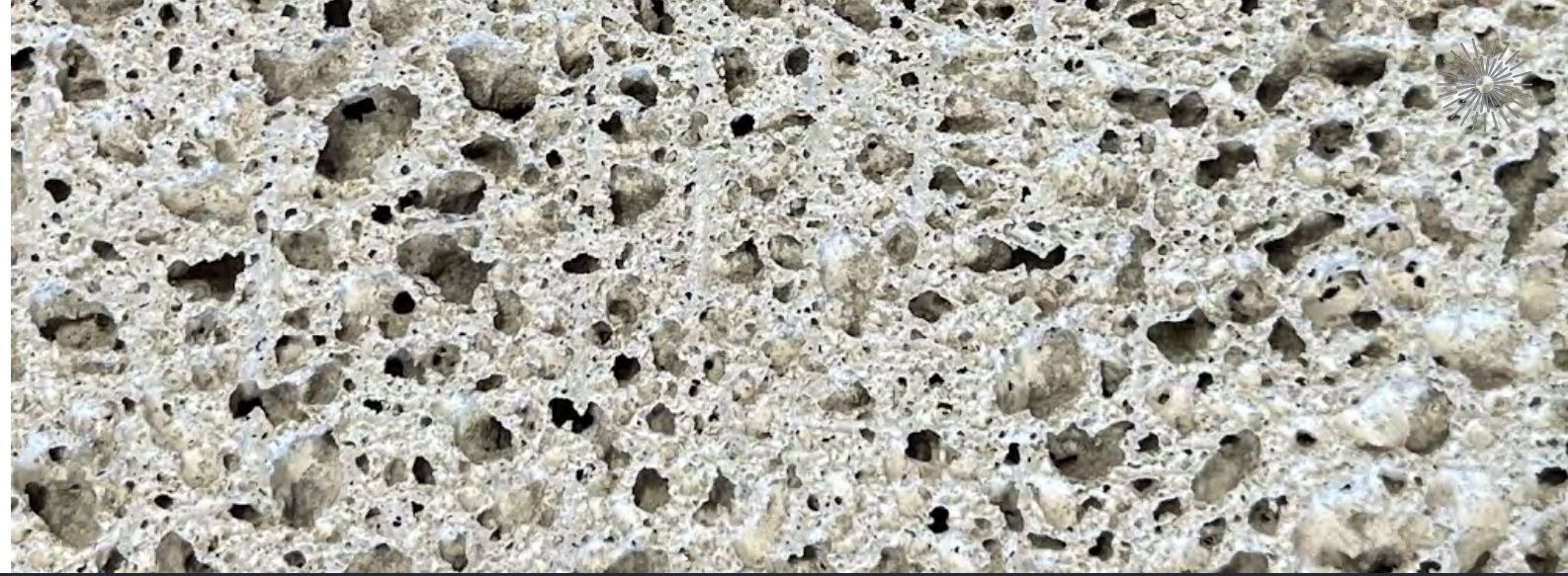
Recycled carbon fiber.

Basalt rebar.

Organic fiber

Aluminum powder.

Materials



- Hollow spheres with thin walls.
- Soda-lime-borosilicate glass.
- Chemical Resistance, durability, lightweight.
- Porous is means of noise reduction mechanism.

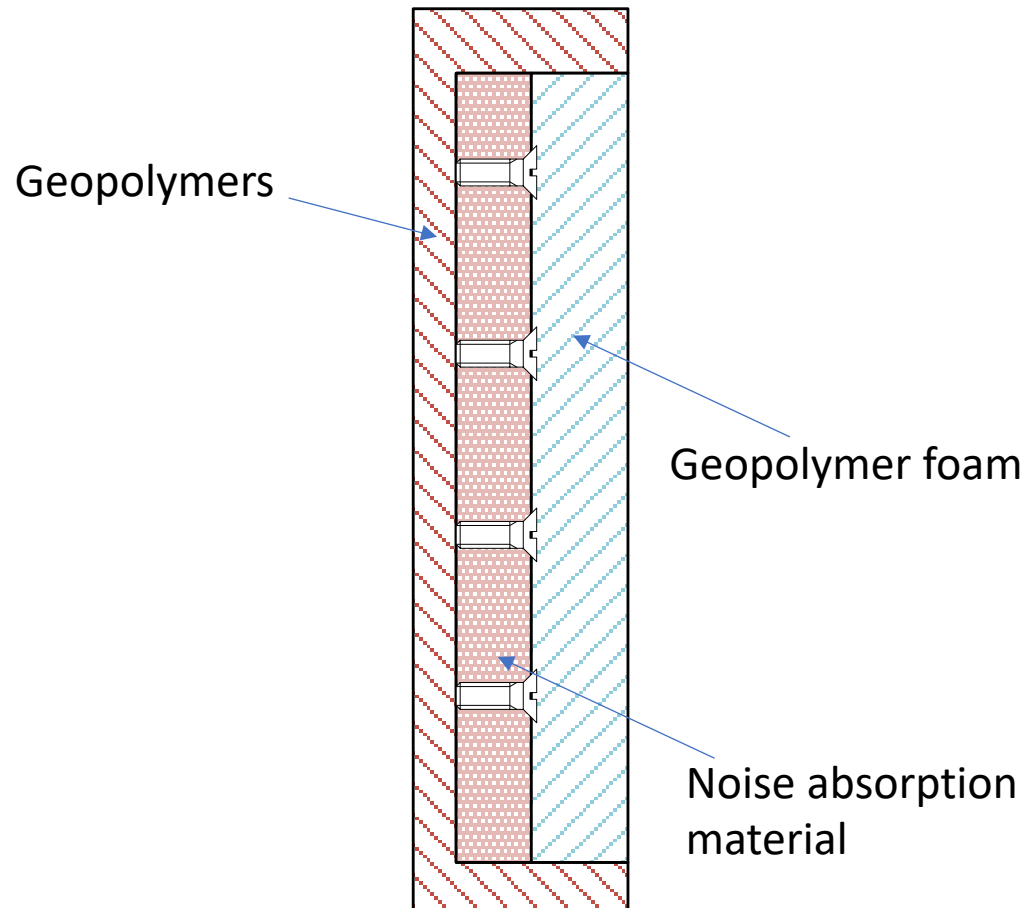
Materials



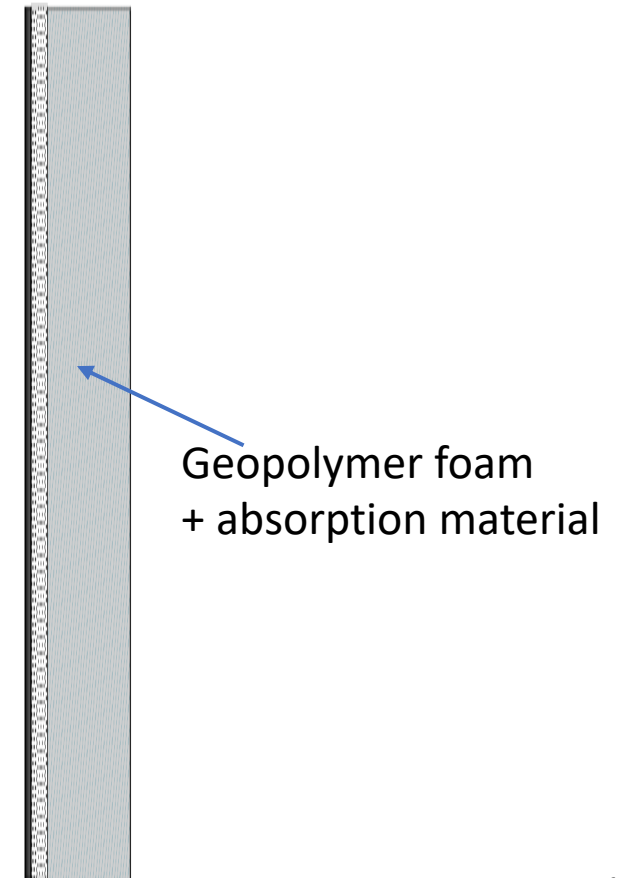
- Basalt rebar weighs 4 times less than steel rebar.
- Its tensile strength is 3 times higher.
- Recycled carbon fiber greatly enhance the mechanical performance.
- Ecological solution, competitive cost.

Barrier structures

1. Sandwich structure



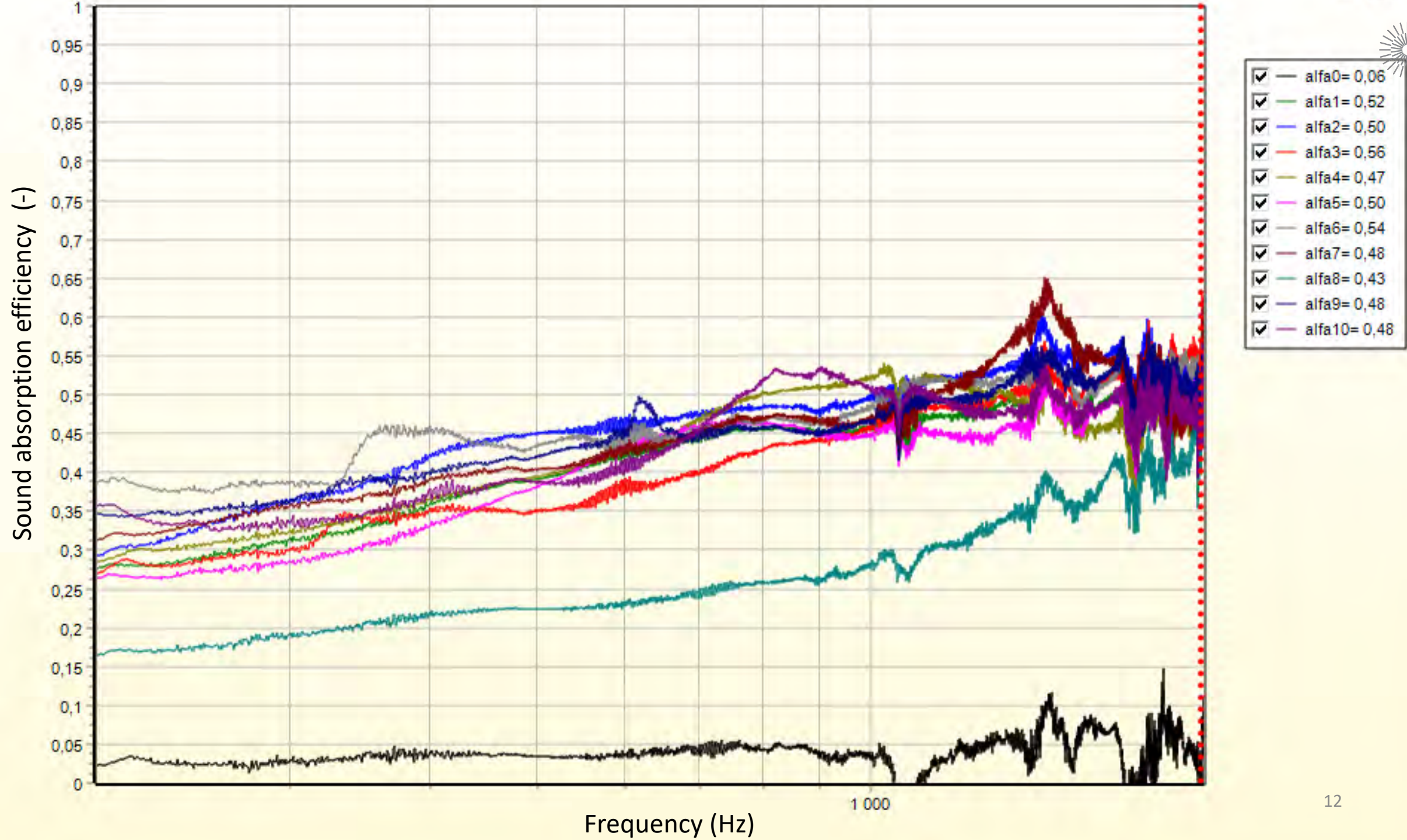
2. Single piece structure





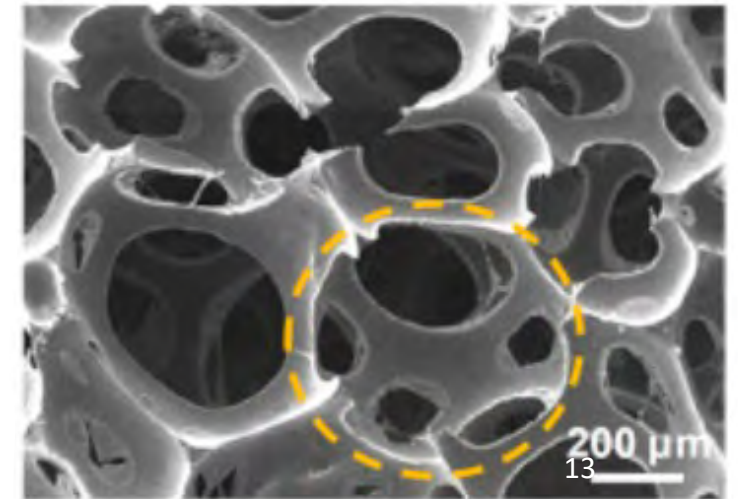
Sandwich structure





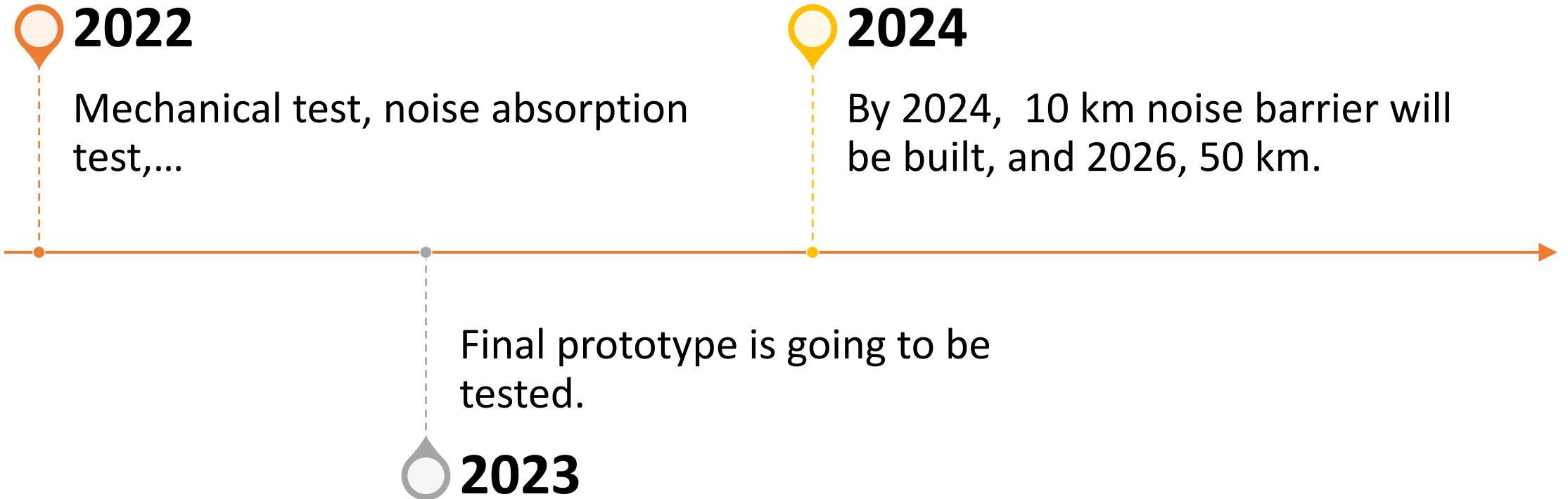
Single piece structure

- High feasibility.
- Extremely lightweight.
- Favorable mechanical strengths.
- Microchannel connecting the pores.





Milestones





Thank you for your attention



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