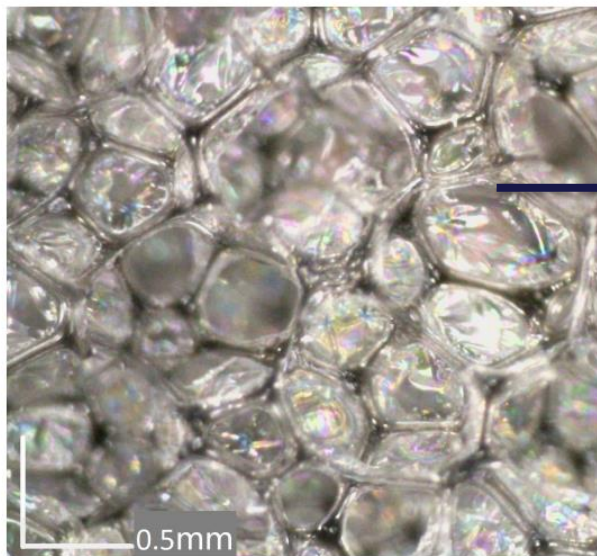


Investigation on the effect of microgeometry of Kelvin-Cell-based porous structures on sound insulation performance

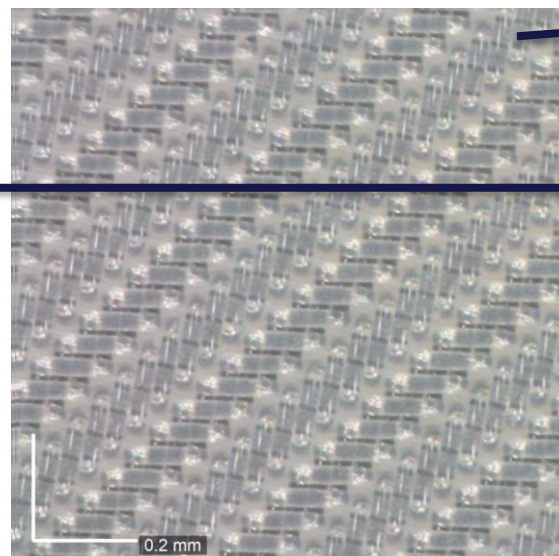
Zenong Cai, Vicente Cutanda Henriquez, Frieder Lucklum

Centre for Acoustic-Mechanical Microsystems (CAMM), Acoustics technology
Department of Electrical and Photonics Engineering
Technical University of Denmark (DTU)
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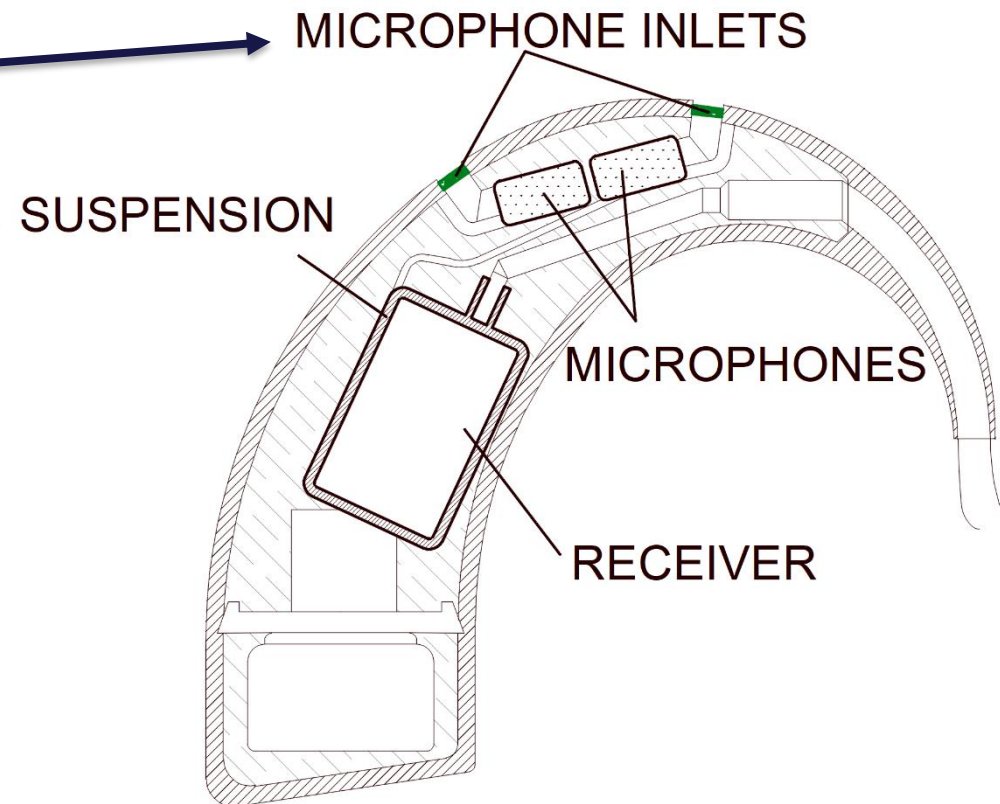
Background



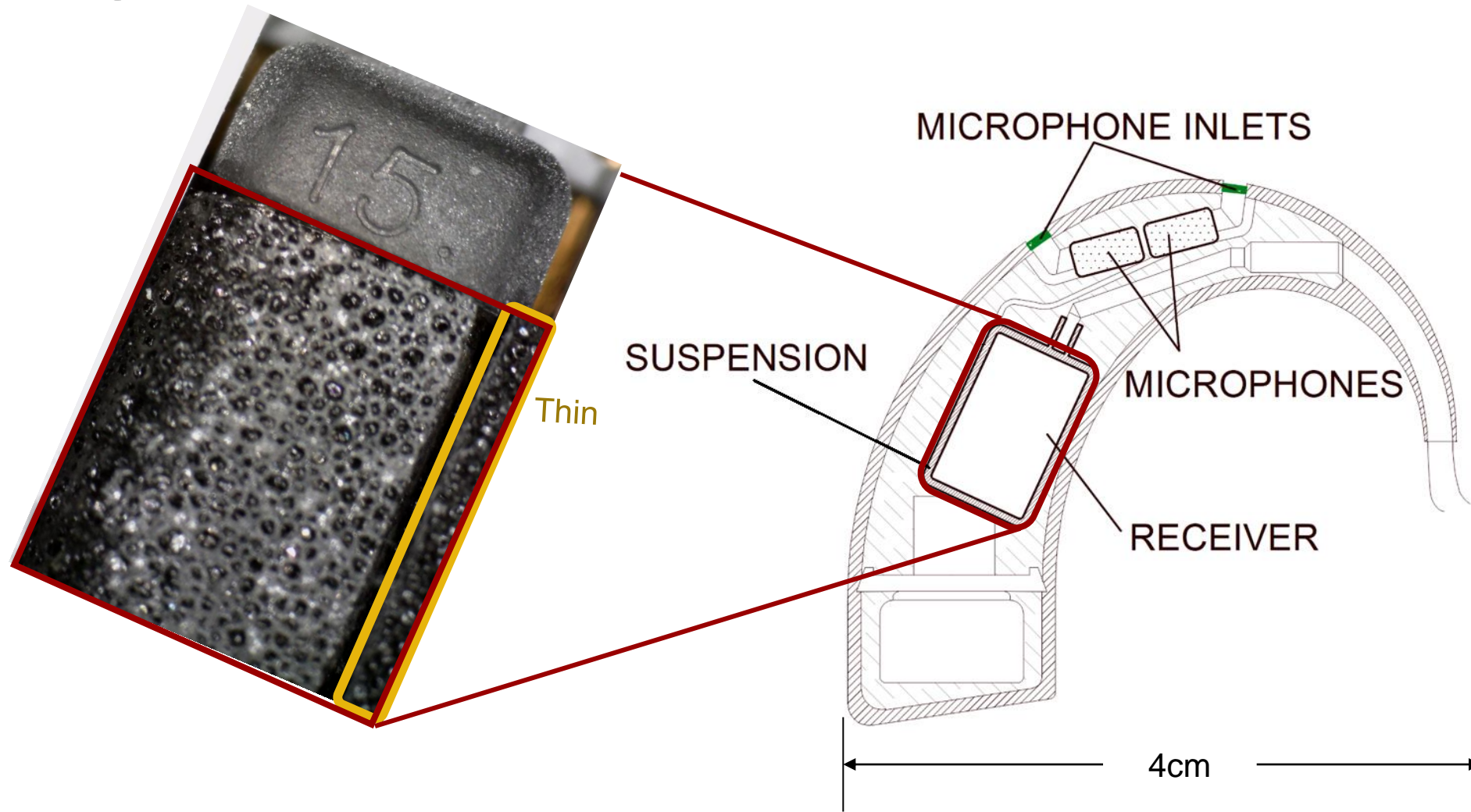
Foam



Mesh



Background

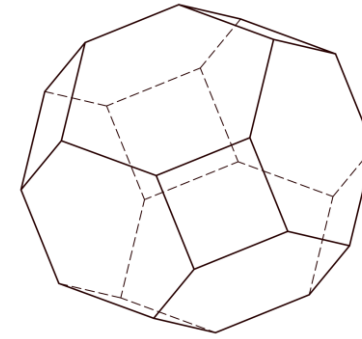


Aim: Find the proper method to characterize porous materials used in the hearing aids.

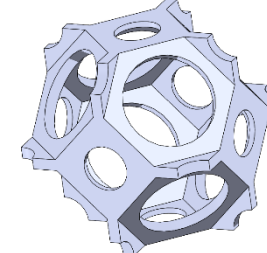
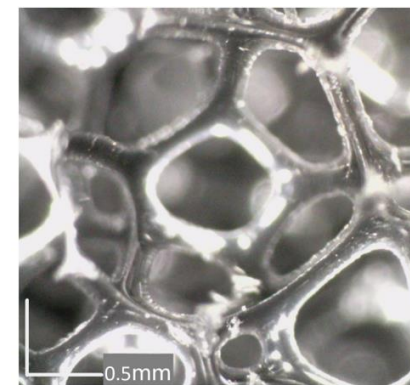
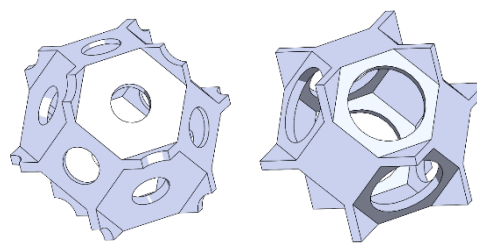
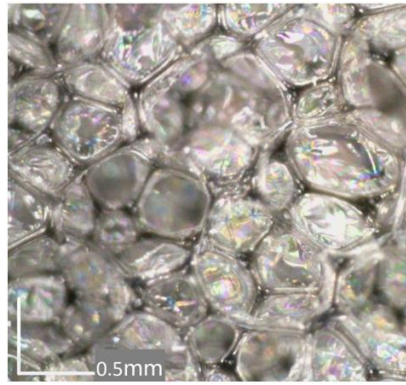
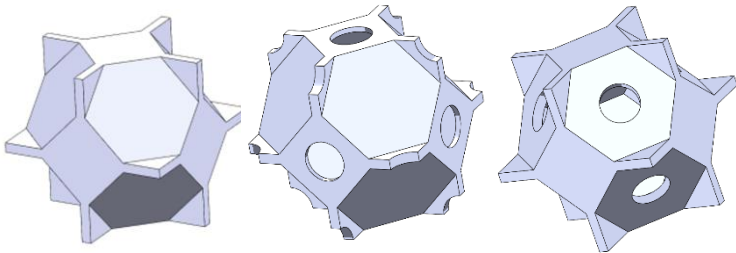
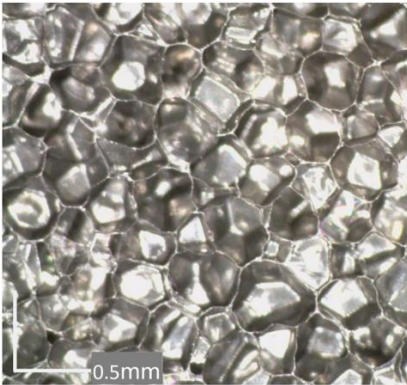
Background

Tetradecahedron:

- Polyhedron with 14 faces
- Truncated octahedron: 8 regular hexagons and 6 squares

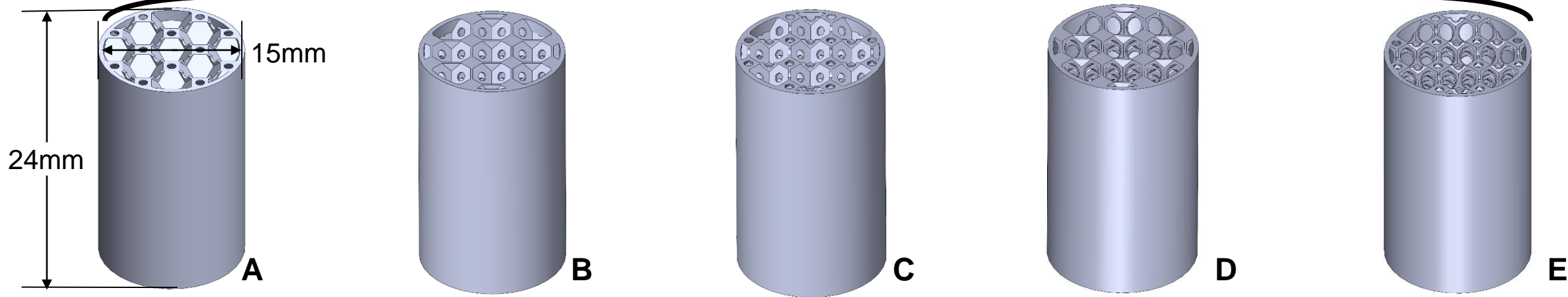
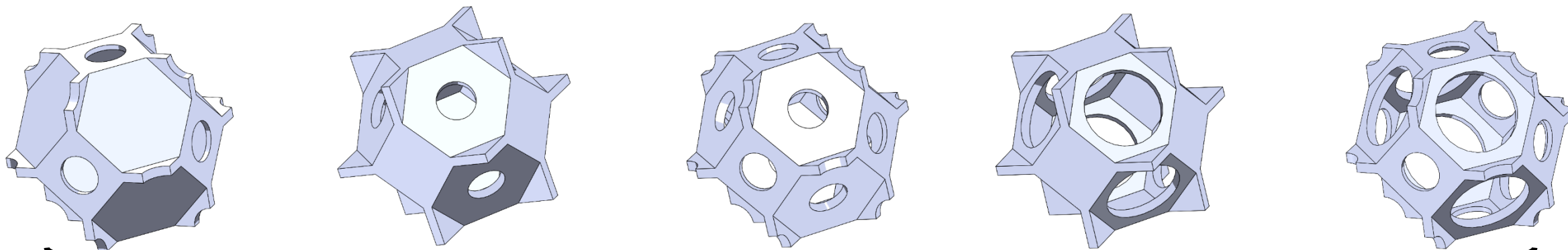


Tetradecahedron (Kelvin Cell)

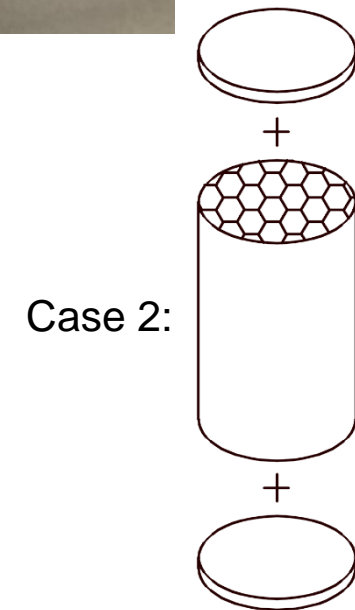
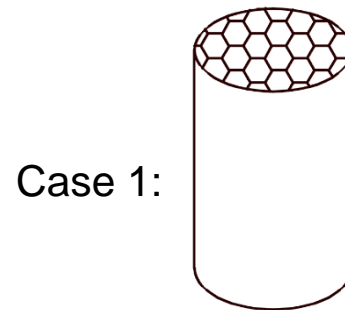
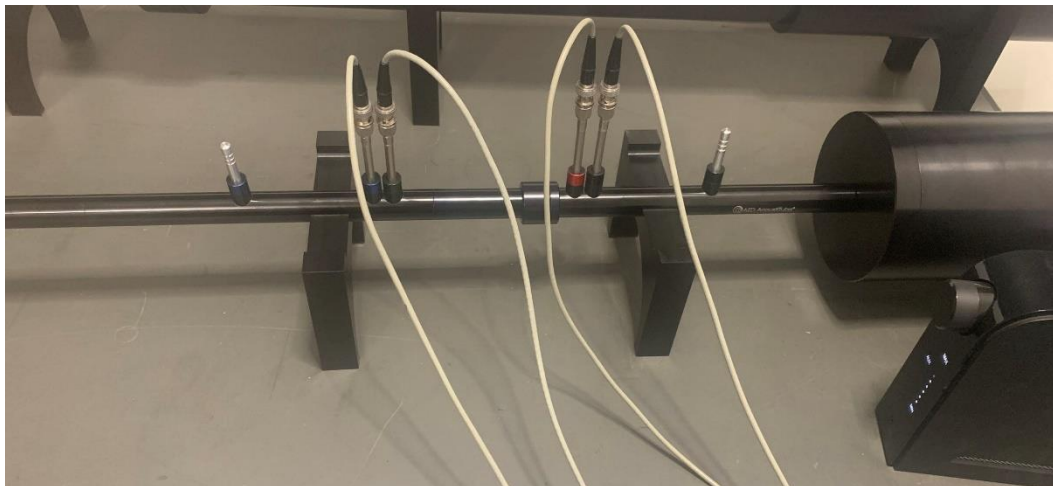
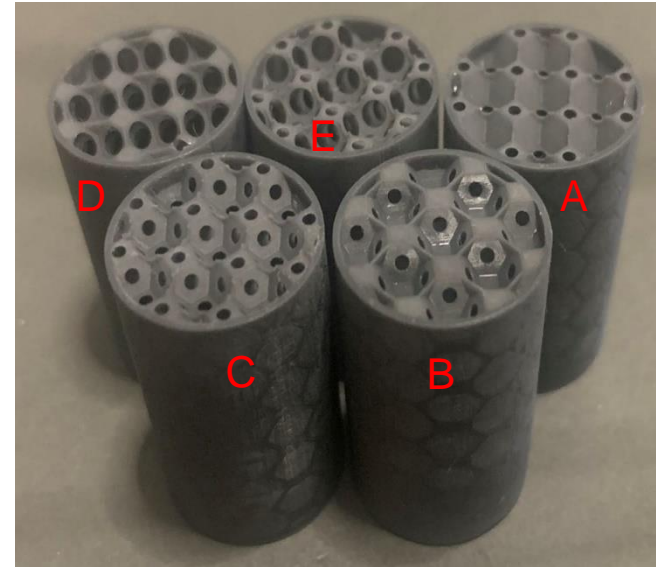
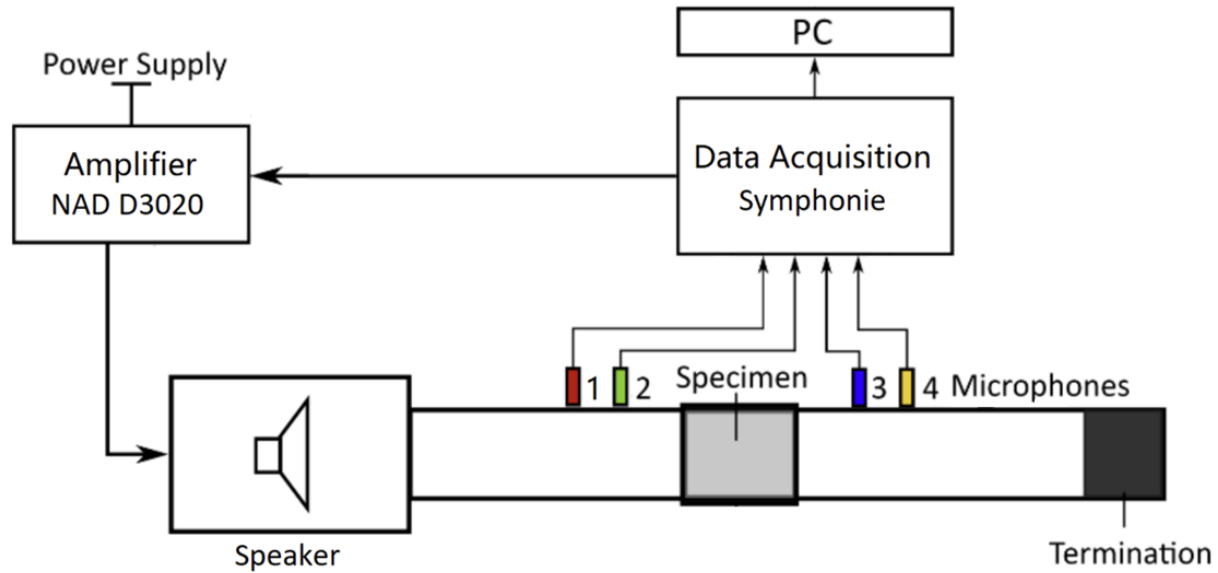


3D models

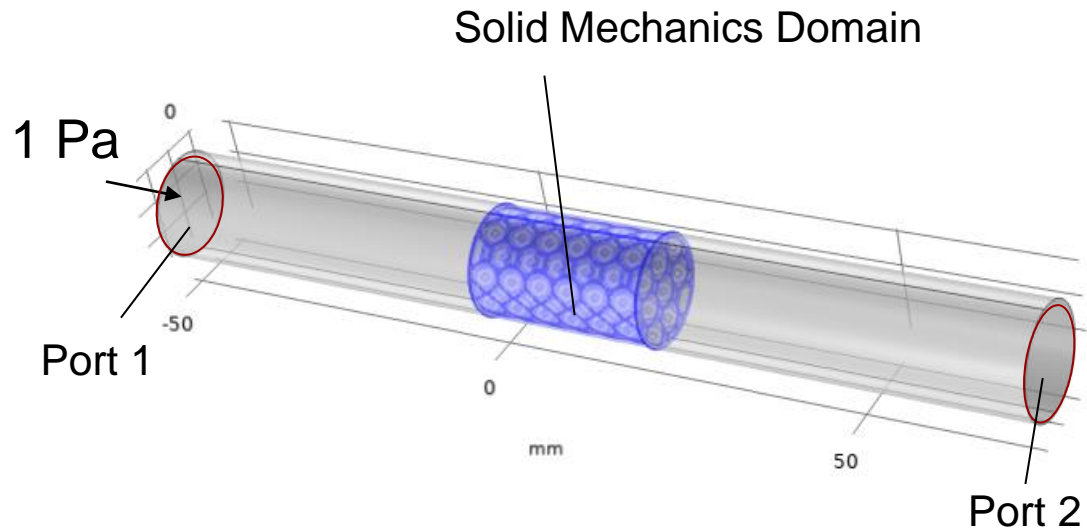
Length: 4 mm
 Diameter of big hole: 1.8 mm
 Diameter of small hole: 0.9 mm



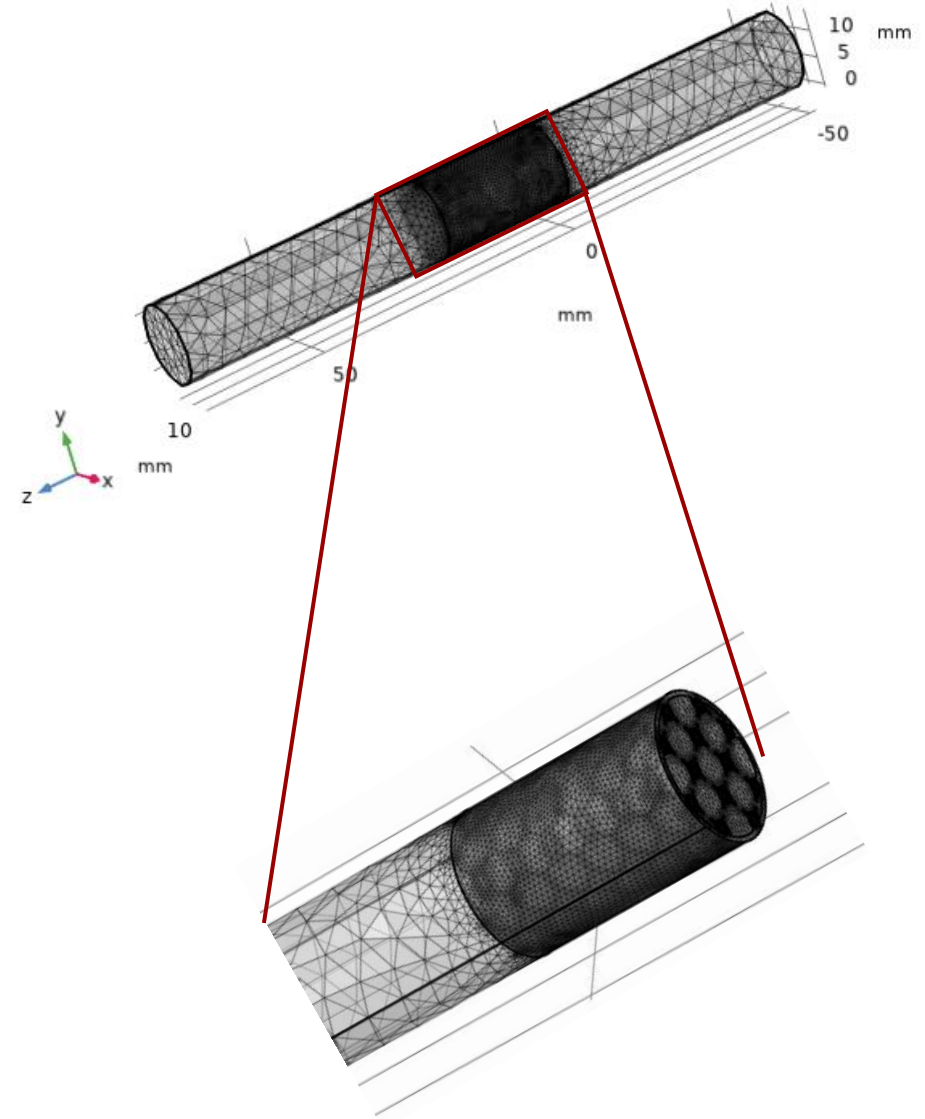
Experiment setup



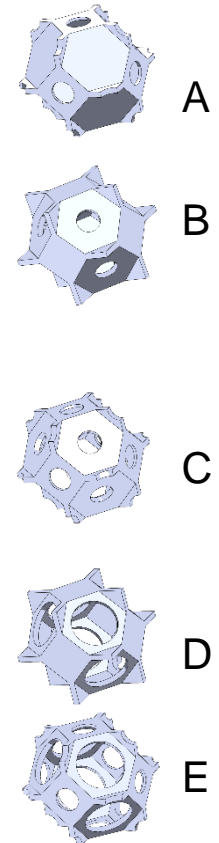
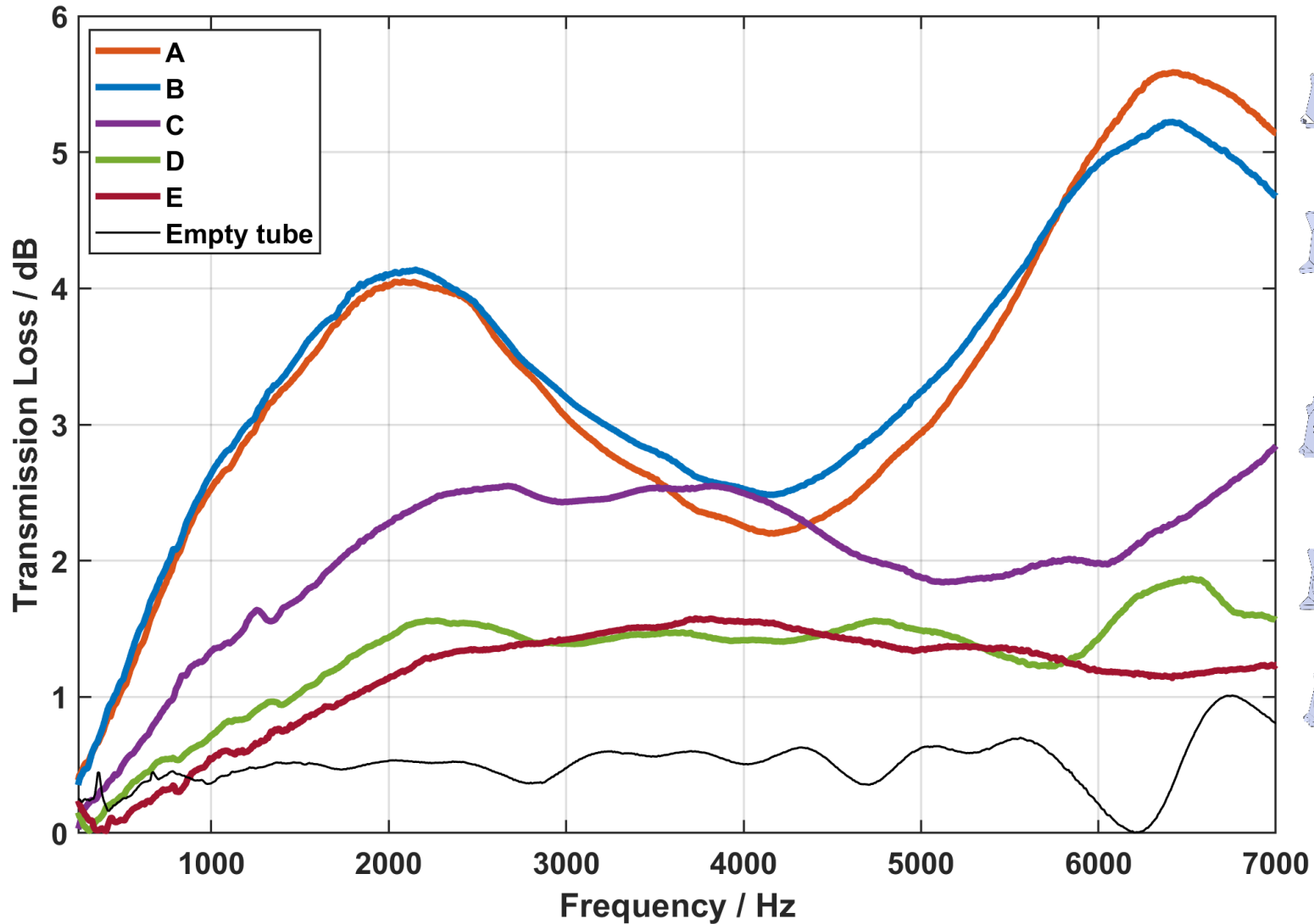
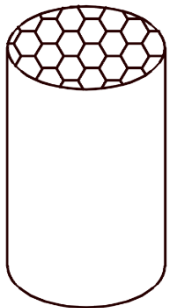
Simulation setup



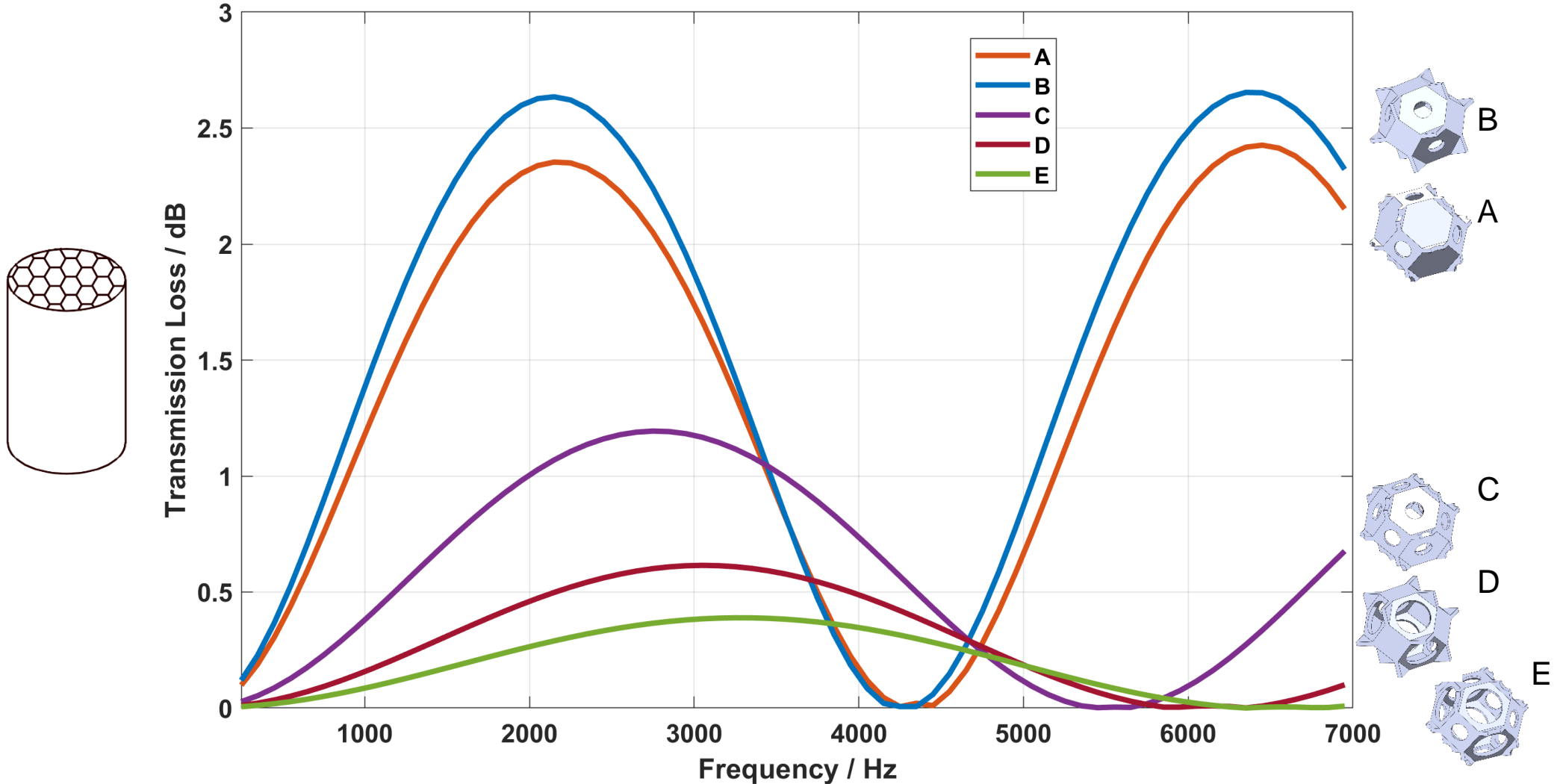
Pressure Acoustics defined in other domains



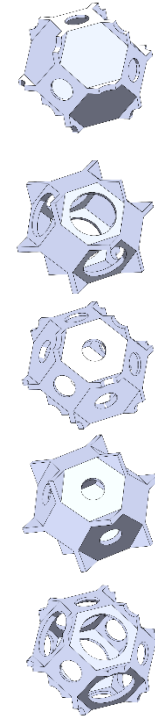
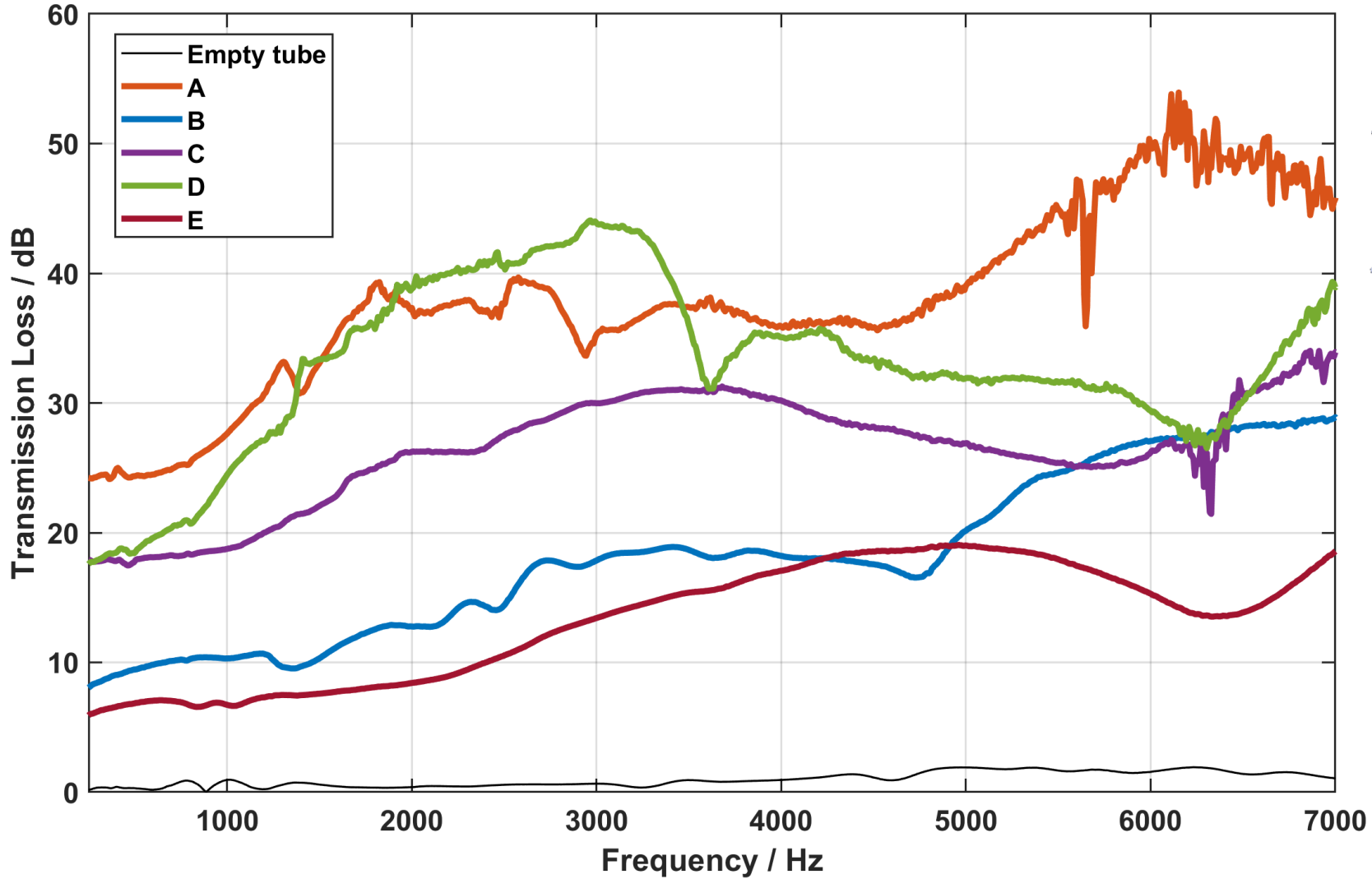
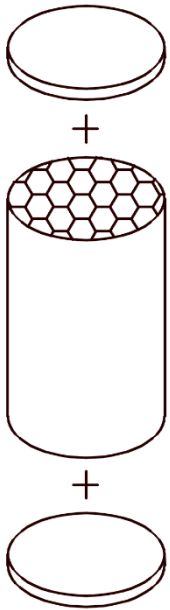
Experiment results of case 1



Simulation results of case 1



Experiment results of Case 2



Conclusion

- Different geometrical parameters affect the sound insulation behavior of Kelvin-Cell foams
- Sandwich structure may influence the above geometry effect
- Simulation can provide relative reliable results

Outlook

- Simulation of case 2
- Simulation of the models with real size
- Introduce randomness of samples

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Thanks for your listening