

Mathematical modeling of biodegradation of metal implants in orthopedics

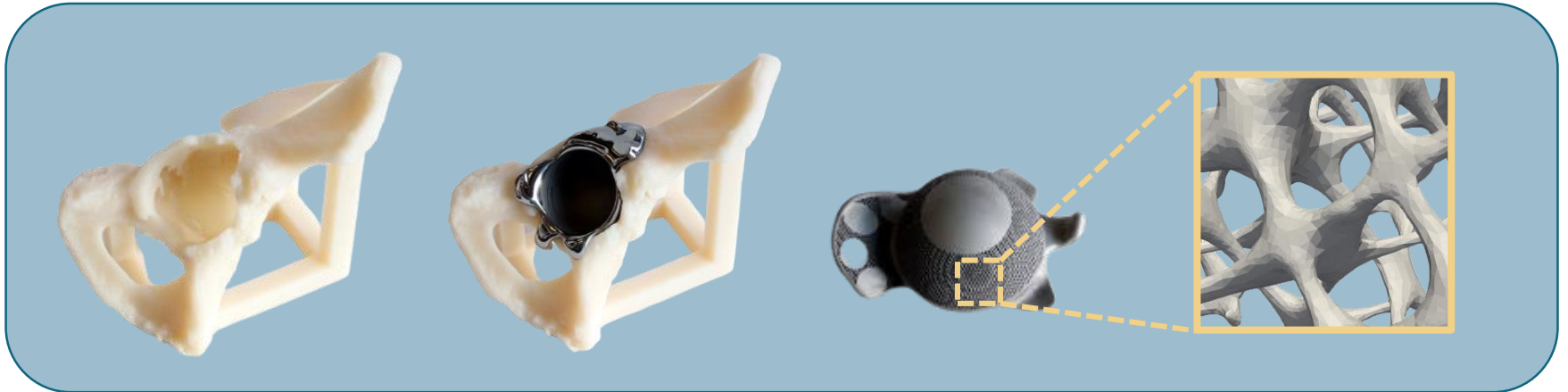
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Liesbet Geris

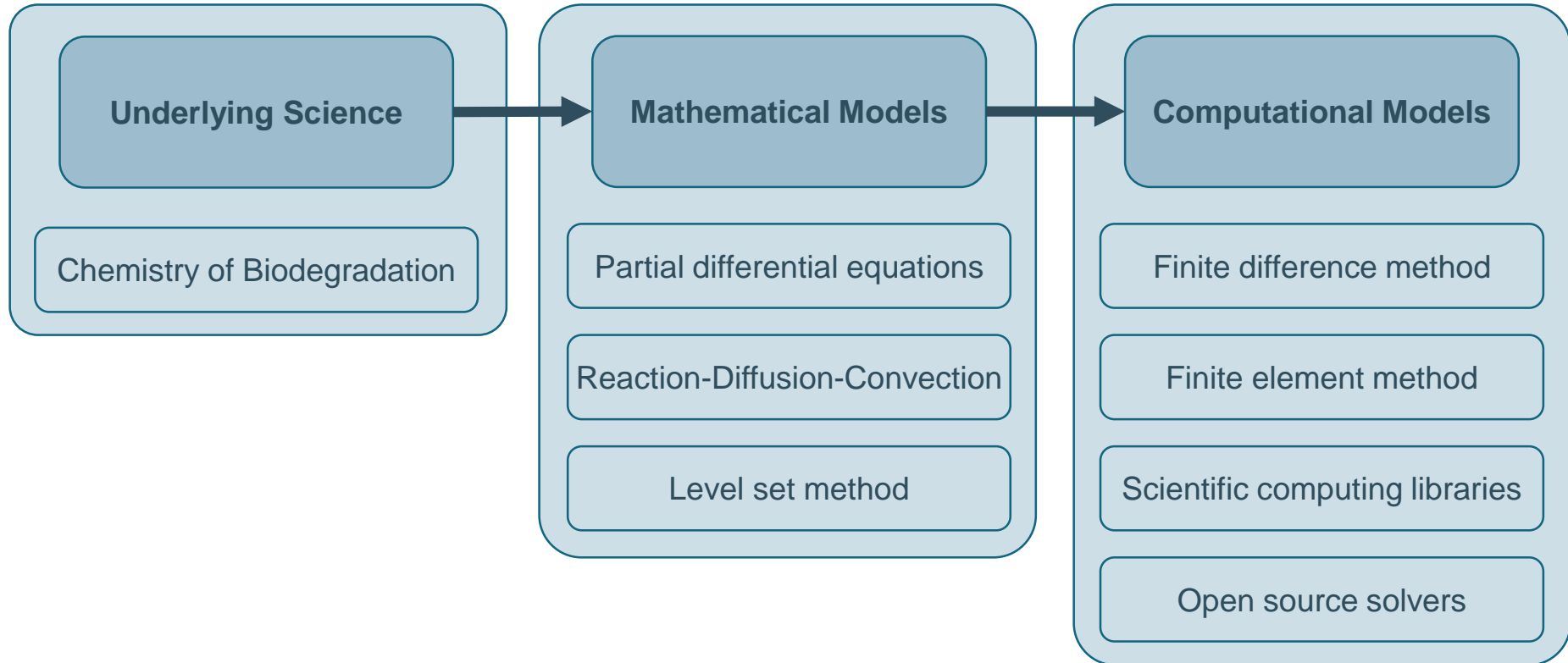


Research Objective

- Goal:
Tuning the degradation of the implant to the regeneration of the new bone
- Will be achieved by:
Building a mathematical framework for the assessment of biodegradation



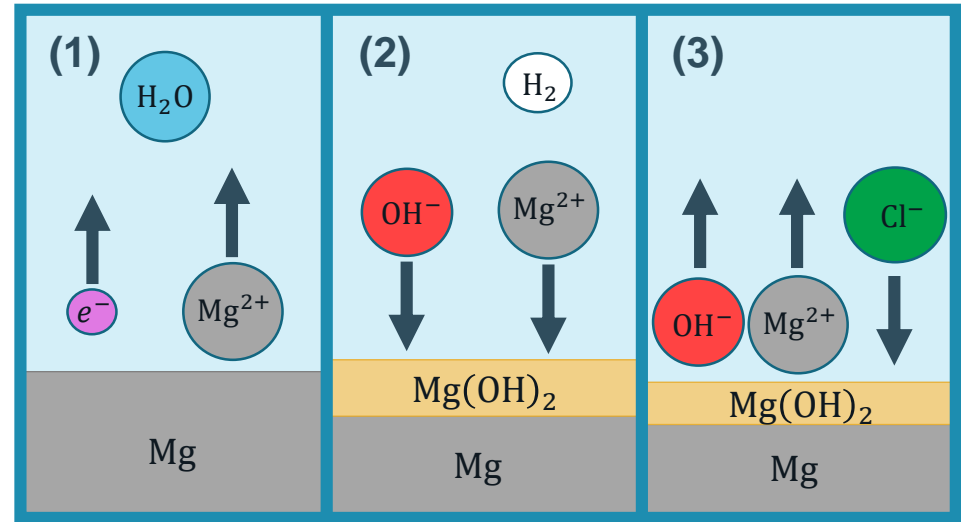
Methodology



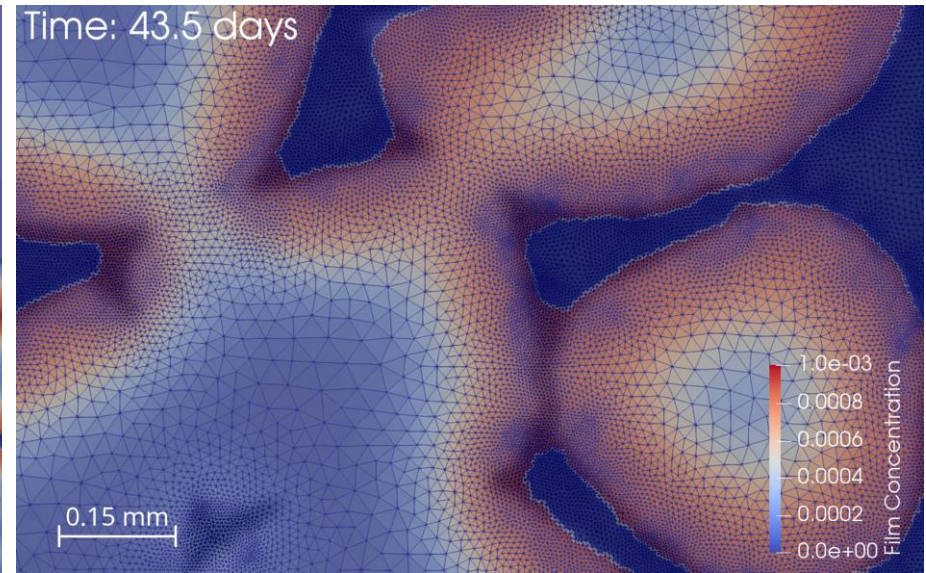
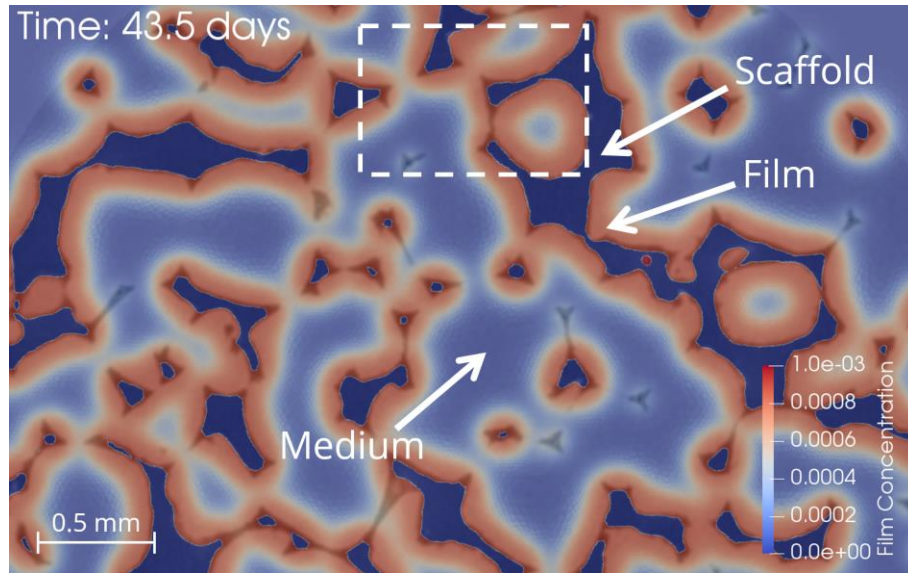
Mathematical Model

The model captures:

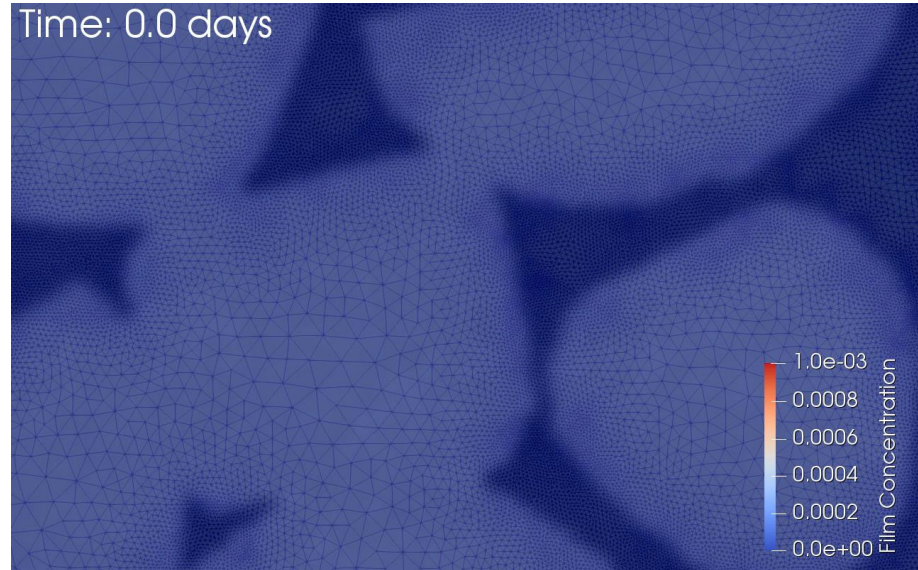
1. The chemistry of dissolution of metallic implant
2. Formation of a protective film
3. Effect of ions in the medium



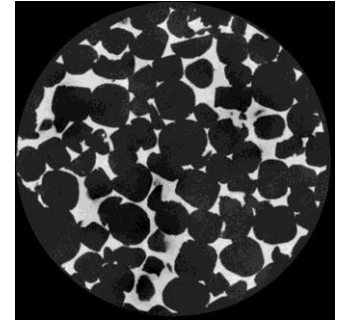
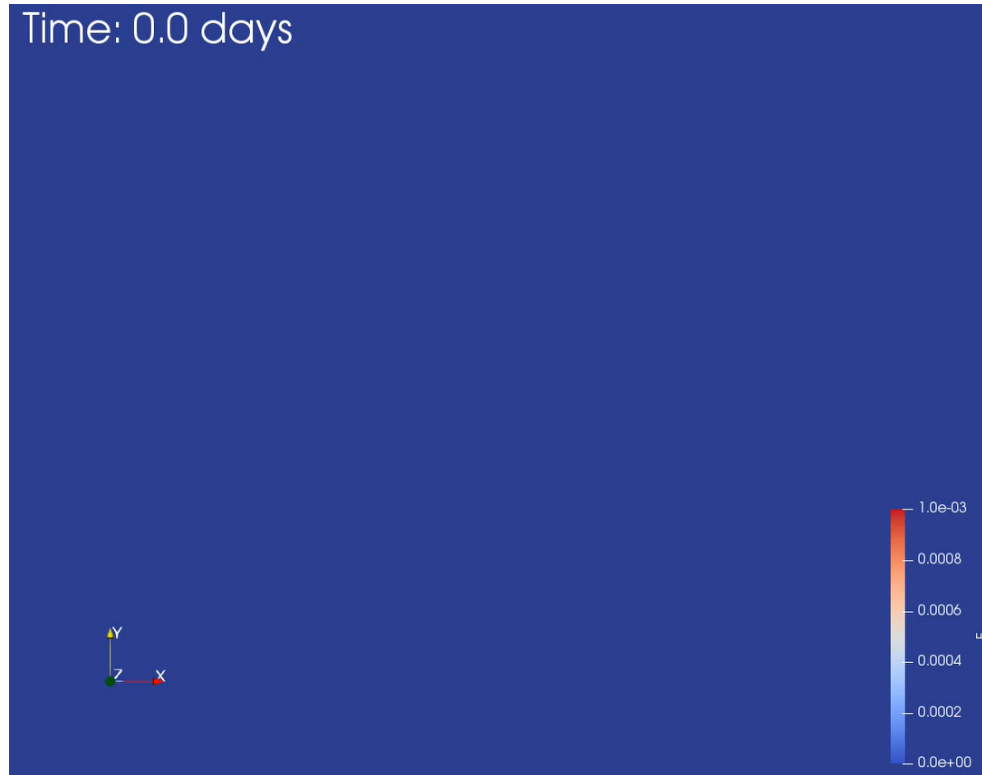
2D Mg Scaffold – Film Formation



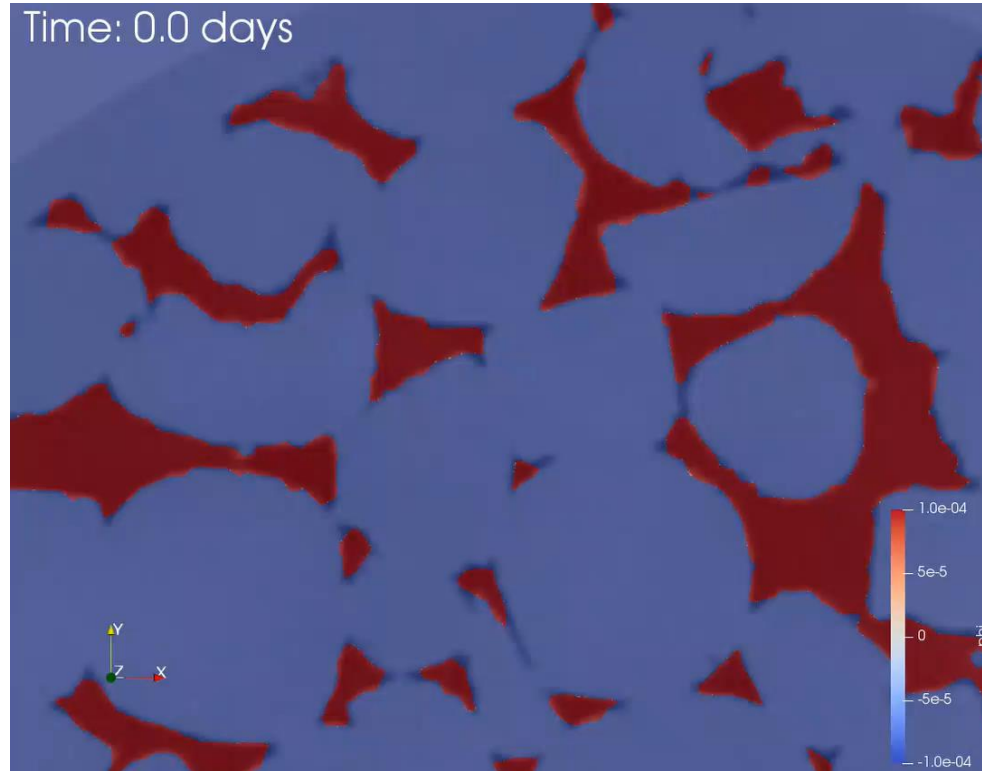
2D Mg Scaffold – Film Formation



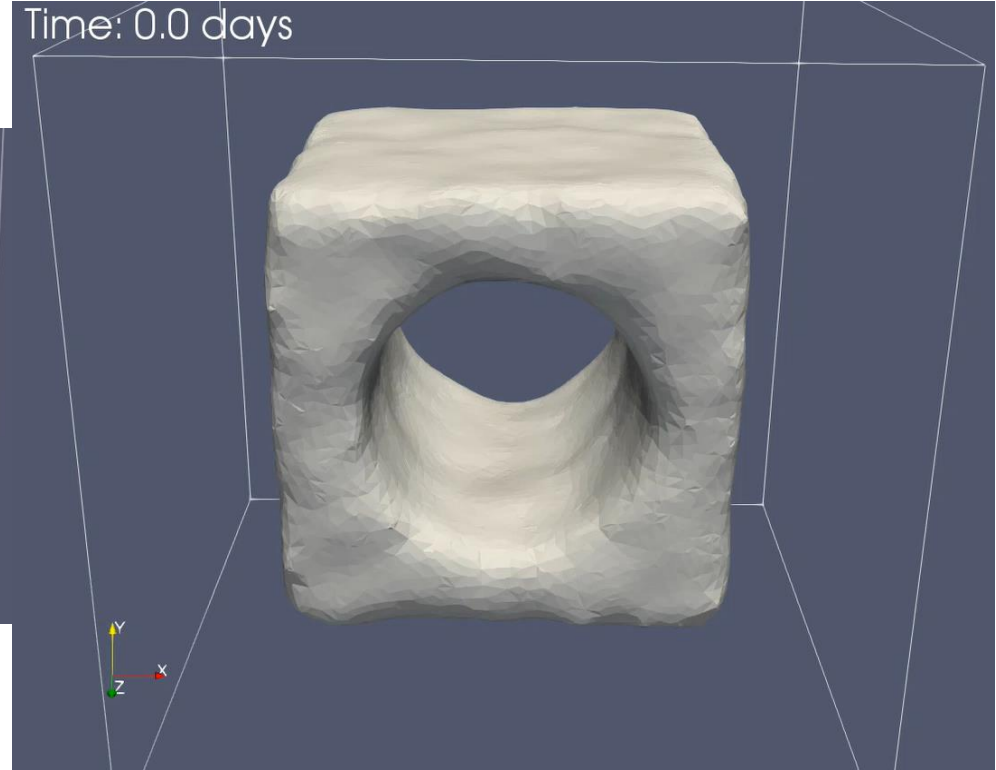
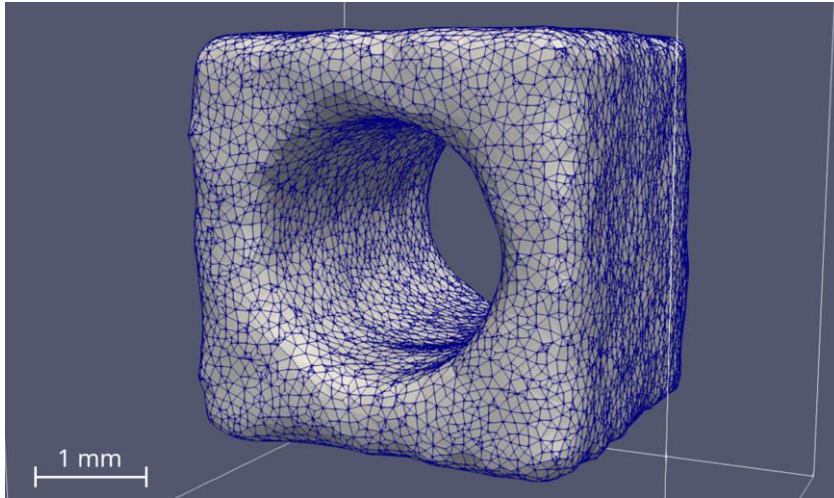
2D Mg Scaffold – Film Formation



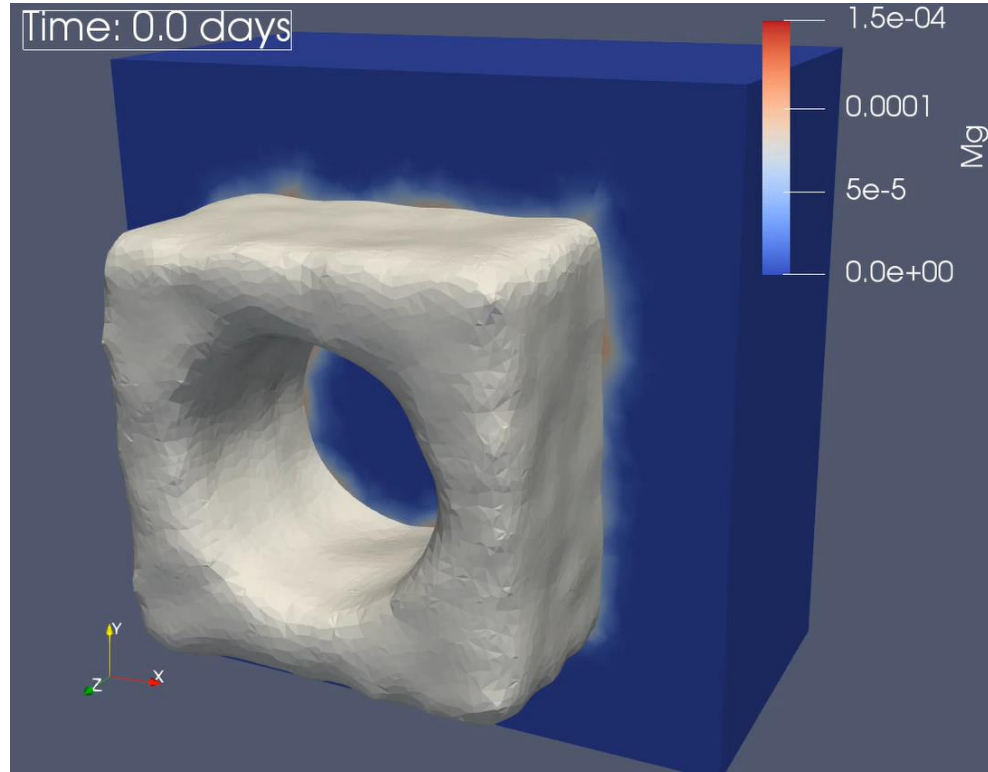
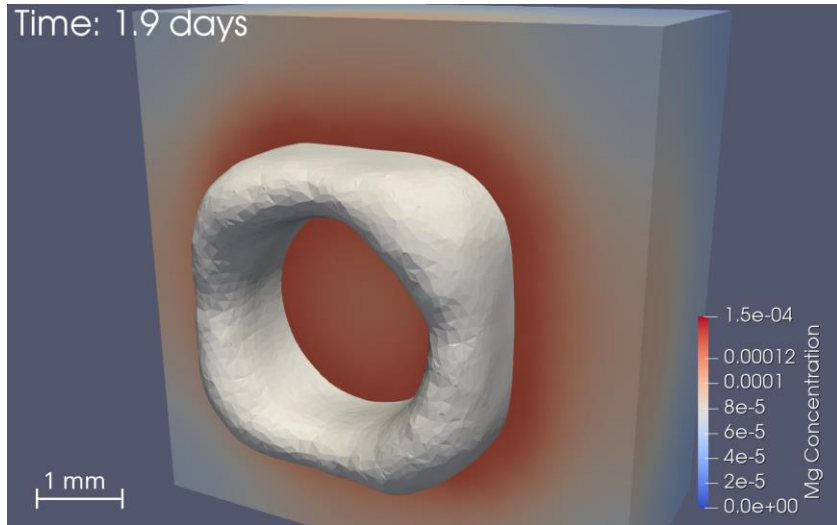
2D Mg Scaffold - Degradation



3D Mg Scaffold - Degradation



3D Mg Scaffold – Mg^{2+} Release



Thank you for your attention

