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Presentation type: **Oral** ✔ **Poster** ☐

Title: Macro-mesoporous polylactic acid foam-pectin aerogel hybrid monoliths: synthesis, physical properties, and biomedical applications

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ABSTRACT (Space limited to 2200 characters)

The following work describes the synthesis, properties, and biomedical application of foam-aerogel monoliths composed of polylactic acid foam acting as a template for the incorporation of pectin aerogel. This research describes the novel approach for preparing mechanically stable macroporous foams, where pores are filled with mesoporous pectin aerogel. Polylactic acid foam is prepared under supercritical conditions that allow the formation of larger interconnected macropores, enabling the diffusion of pectin solution throughout the porous foam and finally the formation of a wet gel. This hybrid material was dried in the presence of supercritical CO_2, and the resulting two-component monolith with macro-mesoporosity was obtained. The surface area increased from 3 $m^2 \cdot g^{-1}$ for the bare polylactic foam to 25 $m^2 \cdot g^{-1}$ for the hybrid material, confirming that the pectin aerogel is entrapped in the foam. Polylactic acid foam presents the major part of the final hybrid and gives higher weight to the final sample. Therefore the surface area of the hybrid material is not nearly as high as for pure pectin aerogel. The presence of pectin was confirmed by thermogravimetric analysis, SEM, and FTIR. Finally, the biocompatibility of macro-mesoporous hybrid materials was tested in the presence of primary human osteoblast cells.