

# Iso-reticular foams fabricated by 3D printing: an alternative approach of structured monolithic devices for catalytic applications

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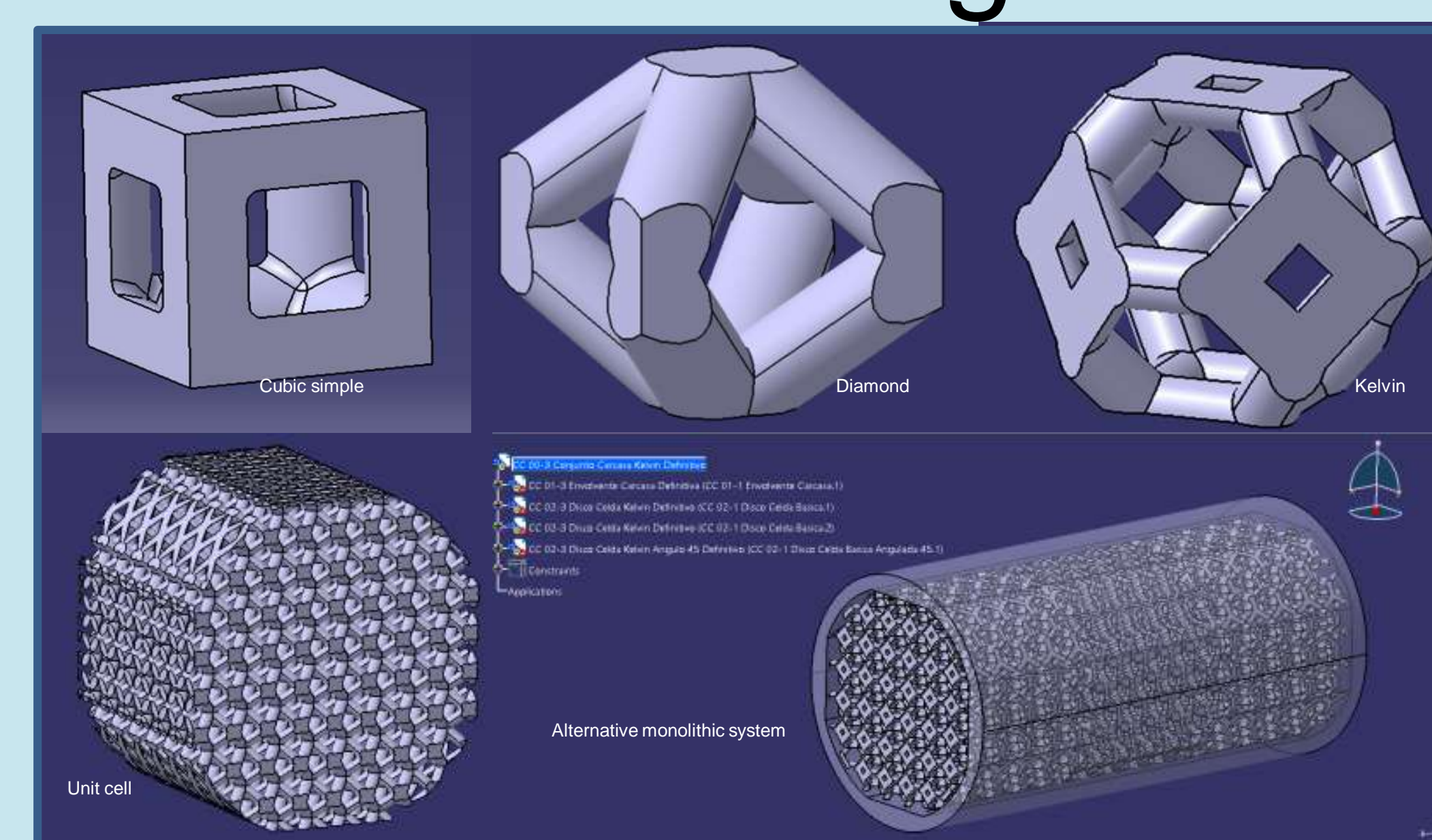


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## Introduction

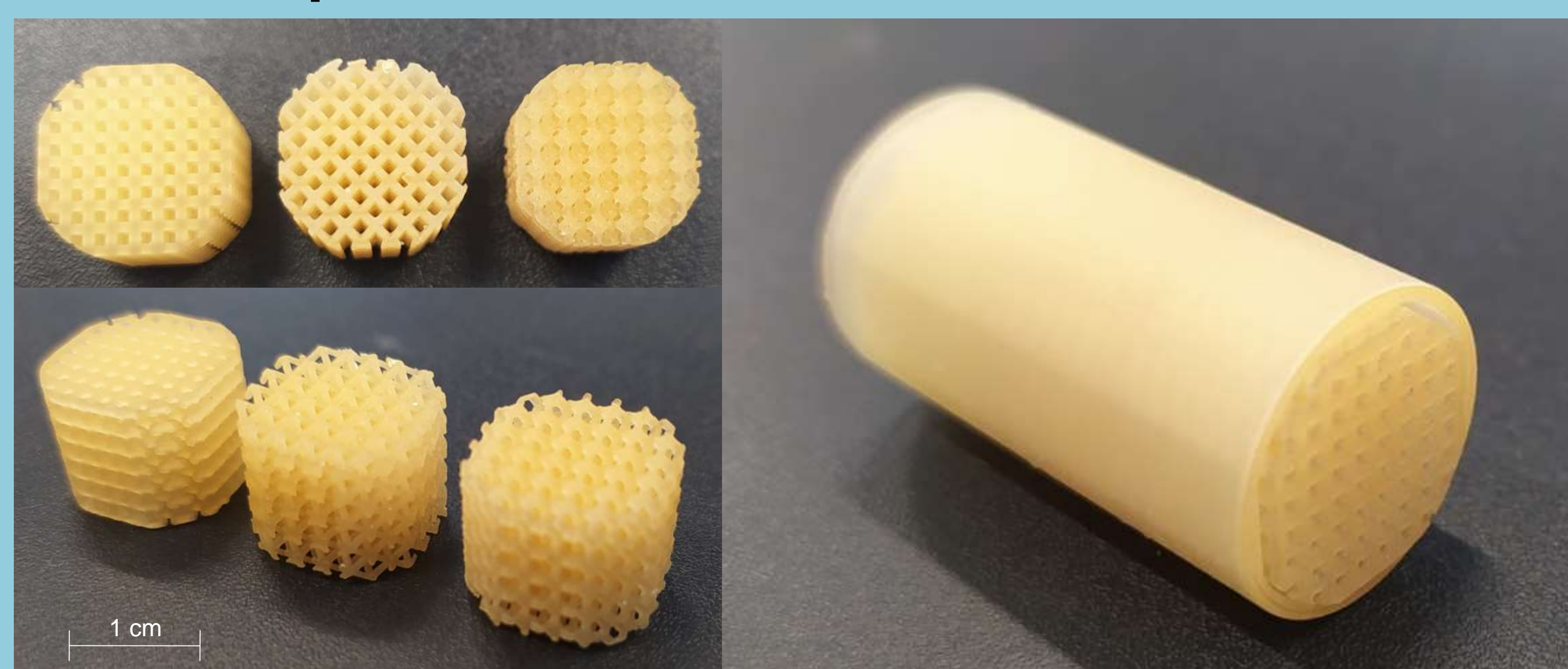
One of the major challenges in the **chemical industry** is to **scale down the reactors** as a sustainable approach to produce chemicals on demand on-site. Reducing the scale of chemical operations keeping or even improving their performance can be achievable by means of adapting innovative tools such as **additive manufacturing (AM)** technologies in the development of advanced reactors aiming to promote the process intensification<sup>1</sup>. The advantages of structured catalysts applied in the chemical industry have been widely analyzed although the possibility of improvement is wide, especially in terms of **design and geometry**<sup>2</sup>. In this sense, the manufacture of **foam-type structures** with a structure of regular cavities can be the first step to generate adaptable reactors to carry out chemical processes in which the transfer of mass and heat must be optimized. The chosen geometries are: Cubic Simple, Diamond and Kelvin structures.

## CAD Designs



**Figure 1.** Monolithic system designed to study different geometries. From left to right (top): CAD file of Cubic Simple, Diamond and Kelvin unit cells. Bottom: CAD of alternative monolithic assembling.

## 3D printed monolithic structures



**Figure 2.** 3D printed monolithic system

Once the CAD and 3D printing settings are optimized, the alternative monolithic assembling is then **3D printed**. Afterthat, a **washing process**, and **UV-curable process** and a **heat treatment** has been done to optimise the properties of the used material.

## Conclusion

The **3D printing optimisation** of these foam-type structures becomes the **first step** for further analysis through the monolithic assembling. **Coating studies and reaction tests** will be investigated.

## REFERENCES

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