# 3D Printing of some unusual monomers

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With the direct 3D printing of cyanate esters via Hot Lithography, without the need of assisting matrix polymers or elaborate functionalization via allyl or epoxy groups, it is possible to freely shape a class of high-performance materials. Until now, they were shaped using time-consuming and expensive molding processes. These are characterized by good mechanical, dielectric and outstanding thermal properties (glass transition temperatures over 300 °C). By developing an initiator system adapted to hot lithography, we were able to directly 3D print structures with good thermo-mechanical properties (Tg above 330°C) for the first time[1].

The 3D printing of phenol-formaldehyde resins (better known as Bakelite) is another milestone. Although this is one of the oldest synthetic thermosets (invented in 1907), it still has enormous importance in industrial applications. This class of material is characterized by its high chemical and thermal resistance and flame-retardant properties. Here, too, the development of a hot lithography-compatible formulation meant that for the first time, the complex and inflexible hot-pressing process for producing Bakelite workpieces could be replaced by a high-resolution 3D printing process[2].

References

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2. R. Wolff, K. Ehrmann, P. Knaack, K. Seidler, C. Gorsche, T. Koch, J. Stampfl, R. Liska, *Polymer Chemistry*, 13, 768-777, **2022**