## Editorial corner – a personal view Thermoset polymers containing bio-based renewable resources

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The use of materials from renewable resources is becoming increasingly important mostly due to environmental and sustainability issues. To replace petrochemical-based materials with bio (agricultural)-based ones seems to be a straightforward strategy provided that there is no competition between food and non-food uses. Unfortunately, recent price trends suggest a strong interplay between food and non-food applications possibly due to the fact that no further fields are available for agricultural cultivation.

Genetic engineering, heavily pushed forward at present, may contribute to a 'polymer-conform design' of natural molecules (for example oils with more double bonds) and also to their better yield. This raises, however, a further ethical question related to the possible contamination of traditional food feedstock with gene-manipulated one. There is much to clarify in respect even when accepting that gene manipulation is nothing else than some kind of a 'forced evolution'.

Oils, fats, resins, agricultural waste have been used in various polymer recipes in the past as modifiers, extenders. Their role is changing nowadays: instead of additives they are becoming essential parts of the polymers. However, in order to widen the use biobased feedstock, its constituents have to be functionalized. The functional groups guarantee the required reactivity of bio-based molecules. Accordingly, bio-based intermediates are predestined for use in thermosets instead of thermoplastics.

Pioneering works have already outlined different reaction pathways for example for the functional-

ization of plant oils. The related strategies considered also the follow-up reactions of the functionalized oils in ring-opening, free radical polymerization, and polycondensation processes. This task is, however, not yet finished - chemists have to check the feasibility of different options and present the related technologies to 'decision-makers'. For the functionalization catalytic methods are likely more suited than those based on traditional chemistry. Though the target of some research works was the full replacement of 'petroresins', the proper combination of petrochemical- and bio-based (agricultural, 'green' etc.) resins is our next task. Functionalized (acrylated, epoxidized, acrylated/epoxidized, maleinated) plant oils are becoming available commercially and their property modification potential in traditional resins should be investigated. There is also a great potential to modify/produce phenolics from bio-based materials. Break-through with the use of bio-based renewable resources requires, however, also support from the politics – there is likely no success when this issue is merely governed by the market.



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