Editorial corner – a personal view

Waste tyre rubber – what to do next?

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The recycling of worn tyres poses a great challenge nowadays. Land filling is no more a viable option in many countries. Energy recovery routes cover the use of tyres as non-fossil fuel and also some energy recovery/material recycling options. Material recycling routes focus on the combinations of particulate (crumb, ground) rubber with polymeric materials. This ensures the flowability under certain conditions and guarantees products' shaping at acceptable cost. Note that the production of crumb rubber from worn tyres is a well established industrial practice.

Civil engineering is using large quantity of crumb rubbers using bitumen, concrete and especially moisture curable polyurethane systems as 'binders'. Major advantage of this 'particle bonding' strategy is that a high amount of waste rubber can be recycled by this way. On the other hand, mostly 'noncritical' rubber items can be manufactured.

Therefore, there is a great demand to find new, value-added use for crumb rubber fractions. Unfortunately, the incorporation of crumb rubber in thermoplastics and fresh, crosslinkable rubbers is strongly limited (less than 10 wt.%) being associated with prominent property degradation. It was concluded recently that value-added application of ground tyre rubber (GTR) can especially be expected via production of thermoplastic rubbers (DOI: [10.1007/s10853-012-6564-2](https://doi.org/10.1007/s10853-012-6564-2)). Here the key issue is to improve the interfacial adhesion between the GTR particles and matrix polymer. This can be achieved by surface modifications and/or devulcanization/reclamation procedures of GTR, by adding suitable compatibilizers to the polymers and performing reactive extrusion. Thermoplastic rubbers can be prepared even in line through continuous

extrusion including the chemical destruction of GTR and its combination with suitable polymers with and without dynamic curing. The production of cellular thermoplastics with GTR content is also a straight-forward strategy (if there is no adhesion between the matrix and GTR then why not avoid this problem by foaming?). Unlike to thermosetting resins, the incorporation of GTR in fresh rubber stocks remains a promising recycling route provided that GTR devulcanization/reclaiming is economically solved. According to the authors' feeling thermo-mechanical and thermo-mechano-chemical decomposition routes should be preferred for that.

One can also recognize a new trend in GTR recycling: other properties instead of the mechanical ones, such as acoustic and vibration damping, become under spot of interest. This is reasoned by the fact that rubbers and with locally inhomogeneous crosslinked structure, like GTR itself, are excellent vibration and sound absorbers.

Albeit a large body of works has been addressed the material recycling of GTR, further efforts are badly needed – so, why not to make a valuable contribution to this issue?

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