The potential of synthetic phosphorus-containing polymers: bio- and flame-retardant applications

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Modern needs in materials science and bioapplications are manifold: From hydrophobic matrices for tissue engineering to water-soluble protein therapeutics demand tailored polymers. The incorporation of uncharged phosphoesters and –amides within the polymer backbone is a unique handle to tune the materials properties both along the main chain, but also at the side chains. A key feature of poly(phosphoester)s (PPEs) is the pendant group that is attached to every phosphorus along the backbone. The combination of the pentavalent phosphorus with modern polymer chemistry allows the synthesis of a material platform for a broad variety of applications, ranging from adhesives or optical applications to tissue engineering scaffolds or polymer therapeutics.

The PPE platform allows us to generate materials that mimic properties of very different polymers such as hydrophobic polyethylene (PE) or water-soluble polyethylene glycol (PEG).

We have developed reliable protocols based on olefin metathesis, radical or anionic polymerization for the synthesis of a whole library of PPEs with tunable hydrophilicity and degradation rate, high reactivity or adhesion properties.


FREE coffee and bagels at the lecture!

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