NOVEL PERFLUOROPOLYETHERS FOR PHOTOPOLYMERIZATION PROCESSES

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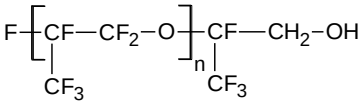
Abstract

Fluoropolymers are used in many high-technology areas as the fluorine element permits outstanding properties demonstrating high chemical and thermal inertness, low flammability, refractive index and surface energy and excellent ageing and weather resistances.[1] However, if long perfluoroalkyl chains are contained in their structure, or such components are added during processing and compounding, safety concerns arise and in different application bring to the product banning.[2] Perfluoropolyalkyethers (PFPAE) based on structural units such as –(CF_2O)–, –(CF_2CF_2O)–, –($CF_2CF_2CF_2O$)– and –($CF(CF_3)CF_2O$)– are an interesting alternative, as they are highly inert, do not crystallize and show T_gs much lower than fluoroalkylic chains.

PFPAEs can be functionalized to be reactive in photopolymerization, a process that has gained special attention due to fast solvent-free reactions at room temperature. Photopolymerization of PFPAEs diacrylate and dimethacrylate containing urethane bonds has already been reported as well as the photocopolymerization of monofunctional methacrylates with hydrogenated monomers.[3–5] The design of PFPAE monomers with new reactive groups is promising for obtaining novel materials, innovating present applications of fluoropolymers and further exploiting photopolymerization. Tailoring the monomer structure starting from the fluorinated building block can tune the properties of the final polymers.

The present work describes the synthesis of new PFPAE precursors having general formula



and their modification to introduce reactive functions such as (meth)acrylic, maleate, fumarate and maleimide groups. The precursors and the reactive PFPAE were copolymerized with difunctional monomers to tune their properties. The bulk and the surface properties of the obtained photocured products were characterized.

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References

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