FRONTAL POLYMERIZATION AS

ENERGY-EFFICIENT WAY TOWARDS COMPOSITES

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Radical Induced Cationic Frontal Polymerization (RICFP) is a cationic ring-opening polymerization applicable for different industrially relevant resins like epoxides, oxetanes or vinyl ethers. In this process, an initial and locally limited stimulus starts the polymerization reaction, which in turn triggers a self-sustaining and propagating curing "wave" throughout the whole resin. As only this first energy input is needed, this makes it a faster and more energy-efficient curing method than the state of the art methods for curing such resins, which often include long curing cycles using autoclaves.

The principle is already well-established in academia, with literature showing its use in pure resin systems[1,2], particle and fiber filled composites[3] as well as prepregs.[4] Especially with the recent advances in this field, different industries have shown interest in frontal polymerization as it could become a useful out-of-autoclave solution for composites.

Herein, radical induced cationic frontal polymerization will be presented with all of its advantages and disadvantages, as well as adaptations of the process towards industry. Overall, the progress from unfilled systems towards composites and the application in filament winding of tanks will be covered.

References

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