

# NoFlameSty

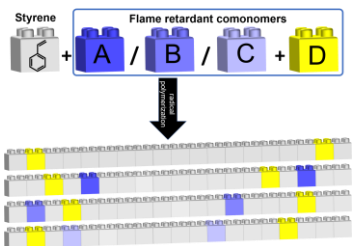
## Intrinsically flame retardant polystyrene without halogens

### Invention

Scientists from Hamm-Lippstadt University of Applied Sciences and the University of Siegen have developed halogen-free polystyrenes that intrinsically contain flame retardant components in the polymer chain. These styrene copolymers can be produced synthetically in a batch process using cost-effective raw materials and are characterized by self-extinguishing fire behavior without the addition of flame retardants. The polymers obtained are completely colorless and odorless and can be extruded and/or foamed using classic processing methods. If necessary, fire behavior can be further optimized by adding flame retardants, depending on the application.



Application example, picture:  
iStock.com U. J. Alexander



Synthesis diagram



Fire behaviour

### Commercial Opportunities

Equipping styrene homopolymers and copolymers with flame retardants is important for a variety of applications. This includes polystyrene particle foams made from expanded polystyrene (EPS) or extruded polystyrene foam (XPS) to insulate building facades, and injection-molded parts made from HIPS, ABS, ASA, etc., for use as components in the electrical and electronic sector. The halogen-containing flame retardant additives for styrene polymers, which are still widely used today, are increasingly coming under criticism due to the release of corrosive gases in the event of a fire and potentially persistent environmental behavior. In comparison, halogen-free flame retardant solutions for polystyrene and styrene copolymers are not currently represented on the market because their flame retardant efficiency is usually insufficient for the stated applications. Until now, halogen-free flame retardant solutions for polystyrene foams have not yet been able to reach a commercially viable stage due to serious disadvantages

such as vivid coloring or an intense odor. The intrinsic, halogen-free flame retardant styrene copolymers developed here by the team of inventors fill a gap in the range of flame-retardant styrene polymers, which is extremely attractive for many applications both in terms of price and in terms of material and environmental properties.

### Current Status

A patent has been filed for the copolymers in Germany; further international patent applications are still possible. We will be happy to answer your questions about the status of the process. A variety of flame retardant copolymers have already been synthesized and tested. On behalf of the universities, PROvendis offers interested companies licenses for the invention and the property right, as well as the possibility of an R&D collaboration.

### Relevant Publications

A doctoral thesis on the topic is being prepared; M.Luksin, Macromolecular Colloquium 2020.

An invention of the Hamm-Lippstadt University of Applied Sciences and the University of Siegen.

### Competitive Advantages

- Halogen-free copolymer
- Colorless and odorless
- Cost-effective raw materials
- Classic batch synthesis

### Technology Readiness Level

12345678

Technology validated in lab

### Industries

- Chemical Industry
- Materials Industry

### Ref. No.

5745

### Contact

Dr. Thorsten Schaefer  
E-Mail: [ts@provendis.info](mailto:ts@provendis.info)  
Phone: +49(0)208-94105-27

