



BUILDINGS, CONSTRUCTION & ARCHITECTURE

CHEMICALS & NEW MATERIALS

# Green process for flame retardant plastics

BUILDING MATERIALS, COMPOSITES AND INNOVATIVE SOLUTIONS | GREEN CHEMISTRY

## PRIORITY NUMBER

EP21383062

## PRIORITY DATE

11/24/2021

## PATENT STATUS

📌 Filed

## LICENSE

Other

## TRL

4

## RESEARCH TEAM | INVENTORS

Ludovico Agostinis, Marco Bortoluzzi, Stefan Ghincolov

Organophosphate-based **flame retardants** can now be produced as additives using a **more efficient and environmentally friendly synthetic strategy**, applied in particular in the preparation of aromatic derivatives containing P(=O)-heteroatoms, which are compounds with multiple structural diversifications and higher fire resistance in both the gaseous and condensed phases.

## Technical Features

The European Commission has placed new restrictions from 2022 on the use of halogen-based flame retardants due to harmful effects on health and the environment. Organophosphate-based flame retardants, in particular aromatic derivatives containing the P(=O)-heteroatom functional group, such as DOPO derivatives, are therefore becoming one of the most promising alternatives to make **plastics flame retardant** in a wide range of applications. However, the main and classical synthetic route for their preparation requires agents that have a high environmental impact (i.e. carbon tetrachloride [CCl<sub>4</sub>], a carcinogenic compound that is harmful to the ozone layer and greenhouse gases). The inventors have identified a new process (TRL 4) that is **efficient, industrialisable and more environmentally friendly** for the functionalisation of molecules such as 9,10-dihydro-9-oxa-10-phosphaphenanthrene-10-oxide (DOPO) and dibenzo[d,f][1,3,2]dioxaphosphepine 6-oxide (BPPO). [Link to the patent information on Ca' Foscari website.](#)

## Possible Applications

- Thermoplastic flame retardant materials (e.g. ABS, PS, SAN, TPU, PMMA);
- Polymeric flame retardant resins and coatings (e.g. PUR, NIPU, Epoxy, Acrylic).

## Advantages

- More efficient, economic and scalable strategy;
- More sustainable process.

## PATENT OWNERS

Aimplas Asociación De Investigación De Materiales Plásticos Y Conexas  
Università Ca' Foscari Venezia

knowledge share

UIBM

Netval

Difusione di Torino

Finanziato dall'Unione europea