**exclusion of fluorinated polymers from PFAS restriction legislation**

General Comment:

ZHEJIANG LANTIAN ENVIRONMENTAL PROTECTION HI-TECH CO.,LTD. is a company specialized in fluorine chemical research and development. The proposal document in Annex B repeatedly mentions that PFAA surfactants such as HFPO-DA, DONA, 9Cl-PF3ONS, PFOA, PFOS, and PFECHSP are crucial additives in the synthesis of fluorinated polymers. These additives exhibit significant toxicity, migratory properties, and bioaccumulation. Moreover, these surfactants have been detected in the residents of countries where fluorinated polymers are manufactured. However, these are not the only facts. We believe that it is possible to achieve zero emissions of PFAA additives in the manufacturing process of fluorinated polymers, thus necessitating the exclusion of fluorinated polymers from PFAS restriction legislation.

Main Reasons:

1. **Non-PFAA additives have already begun industrial applications internationally.** Most manufacturers of fluorinated polymers are actively developing new surfactants to avoid the use of PFAA compounds. For example, companies like Arkema[1] and Solvey[2] have announced the cessation of PFAA additive use in the production of fluorinated coatings, lithium battery binders, and other emulsion products. Arkema employs Pluronic 31R1 as an additive for producing fluorocarbon coatings, while Solvey utilizes water-soluble cellulose derivatives as dispersants in suspension polymerization processes for fluorinated polymers.

2. **Novel alternatives to PFAAs are continuously under development.** Over the past decade, numerous patents have reported the use of non-fluorinated surfactants such as polymerizable comonomers, polyacrylic acids, polysiloxanes, polyethers, and glycosides for the emulsion polymerization of fluorinated monomers like VDF, TFE, HFP, and CTFE (see Figure 1).

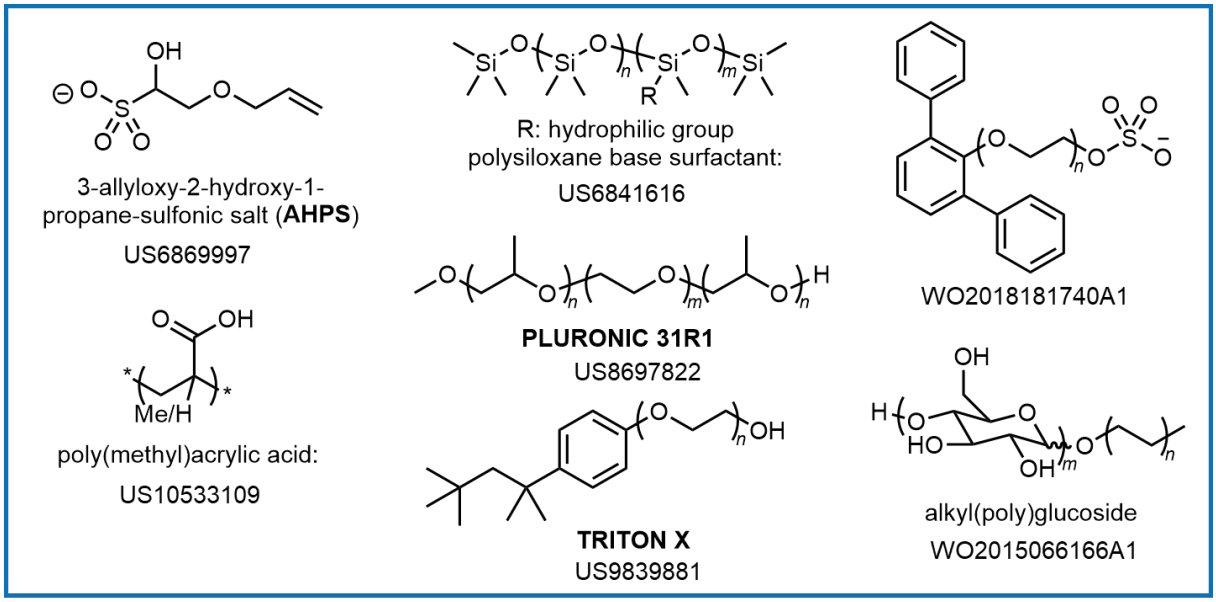

Figure 1: Patented Alternatives to PFAAs.

3. **New recovery technologies enable effective retrieval of PFAAs.** Although the use of PFAA additives is currently considered irreplaceable in certain specific product manufacturing processes, techniques for the recovery and degradation of PFAA additives are continuously evolving. In recent years, a series of new PFAA adsorbents such as PAHs,[3] cyclodextrins,[4] and porous organic frameworks[5] have been reported. These novel adsorbents can effectively detect and remove PFAAs molecules from production wastewater. For example, a new type of porous organic framework can reduce the concentration of PFOA in wastewater to 0.1 ppb within ten minutes, essentially meeting the standards for drinking water purification. Additionally, since this material does not require the use of rare elements, cost reduction can be achieved as the technology matures and production capacity scales up. Even under conditions where PFAAs must be used, zero emissions of PFAAs can be achieved.

4. **Harmless treatment technologies can ensure zero emissions of PFAAs in the process of fluorinated polymer manufacturing.** Dichtel et al. reported a method of alkaline hydrolysis to degrade PFAA molecules at a low temperature of 120 degrees Celsius into inorganic ions and trifluoroacetic acid.[6] Kumar et al. summarized progress made in the past decade using electrochemical oxidation to degrade PFAA molecules; most reported cathodes achieved degradation of over 95% within three hours.[7] Additionally, researchers like Zhang Yanyan proposed a novel reaction pathway for degrading PFAAs using persulfates as oxidants under acidic conditions in a 2019 publication.[8] Persulfates are commonly used inexpensive oxidants in industrial wastewater treatment, and technically, this pathway shows high feasibility.

Therefore, while the synthesis of certain fluorinated polymers for specific applications may still require the use of PFAAs as additives, it is foreseeable that with the widespread application of non-PFAA additives, continuous development of novel PFAA alternatives, and the maturity of PFAA recovery and treatment technologies, it is entirely possible to fully replace PFAAs and achieve the goal of zero emissions of PFAAs in the future.

[1] https://www.arkema.com/global/en/social-responsibility/innovation-and-sustainable-solutions/responsible-product-management/pfas/arkema-comments-on-the-ue-pfas-restriction-proposal/

[2] https://www.solvay.com/en/innovation/science-solutions/pfas

[3] *Nature. Commun.* **2019**, *10*, 5762.

[4] *J. Am. Chem. Soc.* **2023**, *145*, 260.

[5] *Nature. Commun.* **2022**, *13*, 2132.

[6] *Science* **2022**, *377*, 839.

[7] *Chemosphere* **2023**, *321*, 138109.

[8] *Environ. Sci. Technol.* **2019**, *53*, 8672.