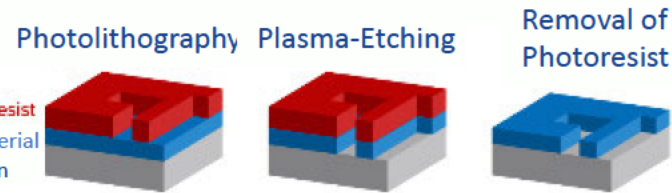


ESIA submission to ECHA public consultation

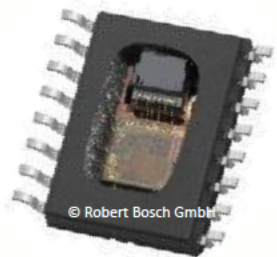

11 December 2023



PFAS use by the Semiconductor industry



PFAS as Process Chemicals
(photoresists, plasma etching
gases, chamber cleaning)



PFAS in articles
(semiconductor products,
adhesives, cables, printed
circuit boards)



PFAS in Semiconductor
Manufacturing related
equipment (Heat Transfer Fluids,
Fluoropolymer in equipment)



PFAS in Facilities
(cooling/heating systems,
Polymers in infrastructure:
filters, tubing, linings, o-rings)

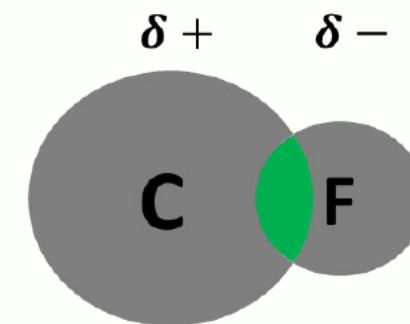


PFAS Applications in the Semiconductor Industry

Exceptional range of physiochemical properties of PFAS allows them to satisfy multiple and overlapping technical requirements for the industry.

- High chemical resistance to acidic, caustic and oxidative substances
- High thermal stability (>260°C)
- Extended service life (>25 years)
- Low degree of friction and abrasion
- Special electrical properties for isolation and low k dielectric
- Chemical purity, stability and compatibility

There are no scientifically known alternatives to PFAS for most applications in the semiconductor industry.



**Strongest single-bond
in organic chemistry!**

Atom-bonding	Binding energy
C-F (in $\text{CF}_2\text{-R1-R2}$)	503 kJ/mol
C-O (single Bond)	358 kJ/mol
C-N (single Bond)	305 kJ/mol
C-C (in Ethane)	376 kJ/mol

The restriction proposal from a semiconductor perspective

- PFAS shall not be not be manufactured, used or placed on the market
- Potential derogation for the '**semiconductor manufacturing process**' until 13.5 years after EiF
- Table A.49 in Annex A **Uses and properties of PFAS in the semiconductor industry identified by stakeholders**
- Table A.49 does not cover all PFAS uses in the semiconductor industry
- Need for update

Updated Table A.49

- Survey among ESIA and SEMI members to identify uses
- Multiple iterations of new table
- New table is very unlikely to be complete
- Results
 - Identified ca. 35 broad use categories
 - Placed them in the four application areas (see slide 2)
 - Explained the properties of PFAS required in those uses
 - Estimated timeframe to substitute after invention is identified

Questions?

Thank you for your attention!

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