



Societal Benefits of FluoroTechnology

Evan Laganis,^{1,2} Steve Korzeniowski,^{1,3} Jessica Bowman¹
¹FluoroCouncil, ²AGC Inc., ³BeachEdge Consulting
www.fluorocouncil.com



Overview

Per- and polyfluoroalkyl substances (PFAS) encompass many classes of chemistry that vary significantly in their physical and chemical properties, hazard profiles, and uses. Because of this variation, it is inappropriate to discuss PFAS as a single class of chemistry.

Only a limited number of the many types of PFAS or FluoroTechnology have a commercial use, most likely in the hundreds rather than thousands.

FluoroTechnology enables the safe and reliable function of a broad range of industrial and consumer products that are essential to modern living.

One type of PFAS, fluoropolymers, provide dynamic properties of strength, durability, heat and chemical-resistance, flexibility and high-performance electrical capabilities to deliver a wide-array of societal benefits. The unique properties of fluoropolymers make them critical to enabling innovation across a broad spectrum of industries, allowing for improved life-saving medical applications, safe and reliable transportation and manufacturing processes, environmental benefits, and durability and performance.

Fluoropolymers are high molecular weight polymers that are extremely stable, inert, not bioavailable, and not water soluble. Fluoropolymers that meet international criteria for “polymers of low concern” do not present significant toxicity concerns and cannot degrade into other PFAS.

Life-Saving Medical Applications

Critical Devices

- Wire insulators that maintain high signal integrity critical to the proper function of electronics in defibrillators, pacemakers and CRT, PET and MRI imaging devices
- Membrane technology used in life-saving vascular grafts, endovascular and interventional devices and surgical meshes to improve the lives and longevity of patients

Diagnostic Procedures

- Low-friction and hemocompatible coatings for catheters, stents and needles improve patient comfort and safety

Disease Control

- Additives to make durable wall coatings resistant to aggressive use of biocides for cleaning to help prevent infections and transmission of diseases in hospitals

Safety & Reliability

Transportation

- Ultra-high frequency wire and cable insulation necessary for navigation, fly-by-wire control and aircraft communications
- High and low temperature brake and hydraulic fluids used in aircraft control systems and brakes
- Wire coatings that increase reliability of engine compartment wiring and gauges that improve auto safety and reduce engine compartment fires
- Chemical and heat-resistant gaskets and O-rings that improve reliability and reduce maintenance frequency and service

Industrial Processes

- Fuel system seals and hoses, O-rings downhole and field equipment gaskets used in oil and gas recovery that improve reliability and safety by resisting extreme heat and harsh chemicals
- Pipes, tanks, valve linings and hoses that provide resistance to high heat and chemical attack in the manufacture, transport and handling of pharmaceuticals and chemicals
- Critical to the ultra-pure semiconductor manufacturing environment which utilizes highly-reactive chemicals and very expensive corrosion resistant equipment

Environmental & Public Health Benefits

Alternative Energy

- Efficient electrolytic ionic migration, allowing for smaller, more efficient lithium batteries critical to all types of modern electronics, including cell phones
- Chemical resistant membranes and dividers in fuel cells
- Superior weatherability, high transparency and flexibility find utility in films used in photovoltaics

Emission Reductions

- Automobile cylinder head coatings and hoses increase fuel efficiency and reduce fugitive gasoline vapor emissions
- Particle and gas filtration that eliminates flue gas emissions from power generation facilities

Drinking Water Sanitation

- Ion exchange membranes replacing the use of asbestos and mercury cells in the production of chlorine used for drinking water purification

Durability & Performance

High Performance Electronics

- Transmission of high frequency signals on which most modern electronics rely
- Improved insulation, weatherability, transparency and water resistance for many valuable electronic products
- Smooth and smudge resistant touch screens

Infrastructure

- Architectural membrane fabrics used in roofs provide weatherability, durability, energy-efficiency and appealing aesthetics, such as for sports stadiums
- Wire and cable coatings which provide high temperature endurance and resistance to fire, chemicals and stress cracking
- Weather resistant industrial coatings which extend the life and aesthetics of outdoor structures, including bridges

Composite Fabrication

- High-temperature, low permeability, non-stick and chemically durable release films and vacuum bag used in very demanding manufacturing processes, including that of aerospace components

