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Document Control Office (7407M)
Office of Pollution Prevention and Toxics (OPPT)
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460-0001

Re: Comments on Proposed Significant New Use Rule for Long-Chain Perfluoroalkyl Carboxylate and Perfluoroalkyl Sulfonate Chemical Substances, Docket Number EPA-HQ-OPPT-2013-0225

To Whom It May Concern:

The Semiconductor Industry Association (SIA) submits these comments to the U.S. Environmental Protection Agency (EPA) on the above mentioned proposed significant new use rule (SNUR) under the Toxic Substances Control Act (TSCA) for long-chain perfluoroalkyl carboxylate (LCPFAC) and perfluoroalkyl sulfonate (PFAS) chemical substances.[1] SIA members have specific ongoing uses of LCPFAC and PFAS chemical substances in the manufacturing and processing of semiconductors and semiconductor devices and components. In addition, SIA members import articles, including, but not limited to, manufacturing tools, equipment, parts, and components, as well as finished semiconductors and semiconductor components and devices that contain, either intentionally or as residuals, LCPFAC and PFAS chemical substances. As more fully discussed below, and as discussed during our meetings with OPPT management, SIA urges EPA to acknowledge that it cannot issue a SNUR for specific,

[1] 80 Fed. Reg. 2885 (Jan. 21, 2015).

ongoing uses by SIA members of substances identified in the proposed SNUR, and should accept SIA's request for an exemption from the SNUR for articles as defined below.

Brief Background on the Semiconductor Industry

SIA is the trade association representing leading U.S. companies engaged in the design and manufacture of semiconductors. Semiconductors are the fundamental enabling technology of modern electronics that has transformed virtually all aspects of our economy, ranging from information technology, telecommunications, health care, transportation, energy, and national defense (see Attachment 1, slide 3). The U.S. is the global leader in the semiconductor industry, and continued U.S. leadership in semiconductor technology is essential to America's continued global economic leadership. Semiconductor innovations form the foundation for America's $1.1 trillion dollar technology industry affecting a U.S. workforce of nearly 6 million.

Modern semiconductors have billions of transistors on a single circuit, and the advanced manufacturing processes and equipment needed to achieve this level of innovation is highly complex. Among other things, advanced semiconductor manufacturing depends on the use of chemicals that are selected because of their unique chemical and physical properties and functional attributes. In most instances, there are typically no viable "drop-in" alternatives to the chemicals in use in the manufacturing process. These chemicals are carefully integrated into advanced manufacturing equipment and processes and have significant interdependence with other process steps. The process of manufacturing semiconductors involves hundreds of carefully controlled steps in which tools apply specific chemicals -- in exactly the right

amount, in exactly the right place, at exactly the right time -- in an automated manner to a thin, round slice of silicon (known as a "wafer") to create numerous patterned layers of the integrated circuit (see Attachment 1, slides 7-11). This process is repeated to selectively deposit, modify, or remove materials from the wafer surface. These processes are conducted in a fabrication facility (a "fab"), a highly sophisticated manufacturing facility.

SIA members continually modernize the technologies they use to manufacture semiconductors and do so with the greatest concern for the safety of workers and protection of the environment. Semiconductor manufacturing occurs in highly specialized equipment, called "tools." Tools are multi-million dollar pieces of equipment comprised of many thousands of parts. The tools perform the various manufacturing processing steps necessary to produce modern semiconductors, typically in an enclosed process with significant, and often redundant, controls and safety measures. Many of the steps in the manufacturing process require total isolation of the product from the surrounding environment to prevent contamination from dust or humidity. The clean rooms in which these operations take place are 10-1,000 times cleaner than hospital operating rooms (see Attachment 1, slide 8). Many of the same conditions that protect the manufacturing process also protect the workers and minimize the release of chemicals to the environment.

The semiconductor industry has a long history of responsible use of LCPFAC and PFAS chemical substances. For example, the World Semiconductor Council (WSC), an organization comprised of SIA and the associations representing other major semiconductor manufacturing countries and regions around the world,

announced in 2011 that the global industry successfully achieved its voluntary goal of eliminating non-essential uses of perfluorooctane sulfonate (PFOS) and making progress in phasing out most essential uses. The WSC reported that worldwide PFOS use by the industry dropped from about 5,000 kilograms (kg) in 2005 to less than 1,000 kg in 2010, while global releases went from 140 kg per year to about 6 kg per year.[2] These reductions were achieved after significant effort to identify and qualify non-PFOS substances as viable alternatives. Typically, new chemistry takes 6-10 years of work and millions of dollars to discover, develop, and deploy in semiconductor manufacturing (see Attachment 1, slide 12). SIA members and their suppliers have sought opportunities to reduce the use of LCPFAC and PFAS chemical substances, but have not yet found viable alternatives in a number of critical uses.

The tools, and the processing steps each performs, are continually being updated to produce semiconductors that operate at ever-improving levels of performance. Each material used in each processing step is selected for its specific properties and function. When the features being manufactured are as small as the features are on a modern semiconductor (tens to hundreds of nanometers wide, or roughly one thousandth of the thickness of a piece of paper, about 100 microns), the performance of each aspect of the manufacturing process must work with near-absolute reliability or millions of dollars of products can easily be ruined. As a result, materials used in semiconductor manufacturing cannot easily be replaced; qualification for new materials can take years to ensure proper function and reproducibility.

[2] Joint Statement of the 15th Meeting of the World Semiconductor Council (WSC) (May 26, 2011) at 18, available at http://www.semiconductorcouncil.org/wsc/uploads/WSC_2011_Joint_Statement.pdf.

Regulatory Background

On January 21, 2015, EPA issued a proposed SNUR for LCPFAC and PFAS chemical substances. For LCPFAC, EPA is proposing to amend an existing SNUR (40 C.F.R. § 721.10536) by designating as a significant new use manufacturing (including importing) or processing of an identified subset of LCPFAC chemical substances (listed in Table 1 of the proposed rule[3]) for any use that will not be ongoing after December 31, 2015, another subset (listed in Table 2 of the proposed rule[4]) for any use except when contained in "fluoropolymer dispersions and emulsions, and fluoropolymers as part of articles," and all other LCPFAC chemical substances for which there are currently no ongoing uses. In addition, EPA is proposing to amend the SNUR for LCPFAC (40 C.F.R. § 721.10536) to make inapplicable the exemption for persons who import LCPFAC chemical substances listed in Table 1 or 2 of the proposed rule[5] as part of articles and make inapplicable the exemption for persons who import PFAS (40 C.F.R. § 721.9582(a)(1)) chemical substances as part of carpet. This proposed rule would require manufacturers, including importers, to notify EPA at least 90 days before commencing the manufacture, import, or use of the LCPFAC and PFAS chemical substances for the significant new uses described. The required notice will provide EPA the opportunity to evaluate intended significant new uses and associated activities before they occur and, if necessary, to prohibit or limit those uses or activities.

With regard to the scope of the SNUR, EPA acknowledges that it cannot propose a SNUR for an "ongoing" use, and is seeking comments specifically on whether

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3 80 Fed. Reg. at 2897.
4 *Id.*
5 *Id*.

there are any ongoing uses of the substances listed. With regard to the comments it seeks, EPA states:

> The LCPFAC chemical substances identified in Table 1 of this unit are known to have current or recent ongoing uses on the basis of their inclusion in reports submitted to the Agency under the 2012 Chemical Data Reporting (CDR) rule. EPA particularly requests comment on whether any of the current uses of any of the specific chemical substances identified in Table 1 of this unit will continue to be ongoing after December 31, 2015. EPA also requests comment on whether there are currently any ongoing uses, including use as part of articles, of any of the remaining LCPFAC chemical substances that were not identified during the 2012 CDR. Furthermore EPA requests comment on whether there are any ongoing uses of PFOA or its salts, and whether PFAS chemical substances are currently imported as part of carpets.[6]

With regard to its inability to issue a SNUR for an ongoing use, EPA states:

> EPA would like to receive comments addressing the extent to which companies manufacturing specific LCPFAC chemical substances for particular uses are utilizing existing sources that are not dependent on the PFOA Stewardship Program member companies and that are expected to continue after December 31, 2015. Because specific uses of those specific chemical substances would be considered ongoing, they would be outside the scope of the significant new use when finalized.[7]

EPA thus acknowledges that there are ongoing uses of the substances subject to the proposed SNUR, and further acknowledges that any such use identified to EPA through comments would need to be excluded from the scope of the final SNUR.

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[6] 80 Fed. Reg. at 2887-2888.

[7] 80 Fed. Reg. at 2889. *See also id.* at 2892 ("To the extent that additional ongoing uses are found in the course of [this] rulemaking, EPA would exclude those specific chemical substances for those specific uses from the final SNUR").

Ongoing Uses of LCPFAC or PFAS Chemical Substances

SIA, in conjunction with the European Semiconductor Industry Association (ESIA) and Semiconductor Equipment and Materials International (SEMI), an organization of equipment and material suppliers to the semiconductor industry, conducted surveys of the industry's major global lithography chemical suppliers and process equipment suppliers. The results of these surveys are found in Attachments 2 and 3. Together, they demonstrate that LCPFAC and PFAS chemical substances continue to be used both by SIA members and their suppliers in (a) semiconductor manufacturing processes; (b) the equipment used in manufacturing; and (c) production and assembly of semiconductor devices ("packages").

Semiconductor Manufacturing Processes

EPA has requested information on uses of LCPFAC chemical substances that are not dependent on PFOA Stewardship Program members. In the lithography chemical supplier survey (Attachment 2), six of the ten responding suppliers indicated that they use LCPFAC or PFAS chemical substances manufactured or imported by companies that were not members of the PFOA Stewardship Program. The survey also indicates that 71 percent continue to use LCPFAC or PFAS chemical substances in photolithography process formulations and 50 percent continue to use LCPFAC or PFAS chemical substances in anti-reflective coatings (ARC). These results comport with the current PFAS SNUR (40 C.F.R. § 721.9582) that states PFAS chemical substances used "as a component of a photoresist substance, including a photo acid generator or surfactant, or as a component of an anti-reflective coating, used in a photomicrolithography process to produce semiconductors or similar components of

electronic or other miniaturized devices" are not a new use.[8] The survey also shows that LCPFAC and PFAS chemical substances are still manufactured, imported, processed, or used despite EPA's statement that "there were no other companies that reported manufacture (including import) of LCPFAC chemical substances in the 2012 CDR." [9] These substances may not have been reported in the latest CDR because of their low production volumes, or because they are being manufactured or imported by small businesses that are exempt from reporting. Note that the survey (Attachment 2, slide 9) shows the aggregate amount of LCPFAC and precursor chemical substances supplied by companies to semiconductor manufacturers in 2014. In North America, the total amount of LCPFAC chemical substances reported as manufactured or imported in 2014 was 418 kg; similarly, the total amount of LCPFAC precursors reported as manufactured or imported in 2014 was 114 kg. Even if the entire amount were for a single substance from a single company, it would still be below the CDR reporting threshold. We (SIA, ESIA, and SEMI members) anticipate the uses of these chemicals in our industry to continue, so LCPFAC and PFAS chemical substances will be manufactured or imported notwithstanding the December 31, 2015, deadline of the PFOA Stewardship Program.

SIA members have been responsibly using LCPFAC and PFAS chemical substances in semiconductor manufacturing for many years. Specifically, these chemicals are used by semiconductor manufacturers during photolithography and related processes. These LCPFAC and PFAS chemical substances provide critical acidity, surfactancy and anti-reflectivity properties for photoacid generators, photoresist

[8] 40 C.F.R. § 721.9582(a)(3)(ii).
[9] 80 Fed. Reg. at 2889.

polymers, anti-reflective coatings, and other processes related to semiconductor manufacturing. After extensive discussions between SIA and EPA starting in 2001, EPA recognized these critical uses in the SNUR for PFAS chemical substances.[10]

SIA members and their suppliers have made significant strides in reducing the amount of perfluorinated substances used and in the transition to shorter chain perfluorinated compounds, but we have not found viable alternatives of the substances covered by the proposed SNUR in several critical applications. As EPA is aware, the research and qualification of alternatives requires many years and substantial financial resources (see Attachment 1, slide 12). Until that research is successful, SIA members will continue to use LCPFAC and PFAS chemical substances; as such, EPA cannot issue a final SNUR for these substances in these critical uses. To this end, SIA requests that EPA:

1) Maintain the current designations in 40 C.F.R. § 721.9582 for existing paragraphs (a)(1) and (a)(3)(ii);

2) Add as paragraph 40 C.F.R. § 721.10536(b)(4)(i) "Manufacturing (including import) or processing of chemical substances identified in paragraphs (b)(1), (b)(2), and (b)(3) for use in semiconductor manufacturing or processing, or in semiconductor component manufacturing or assembly, shall not be considered as a significant new use subject to reporting."; and

[10] 40 C.F.R. § 721.9582(a)(3)(ii).

3) In proposed paragraph (b)(4)(iii), change "Import of fluoropolymer dispersions…" to "Import or processing of fluoropolymer dispersions…"

Articles

SIA members import or purchase domestically semiconductor manufacturing equipment ("tools"), parts, fab infrastructure equipment, and ancillary equipment. These tools, parts, and equipment are considered articles under TSCA. In addition, the semiconductor devices or packages (*i.e.,* the final housing used to protect a semiconductor and connect it to a circuit board, not temporary materials or containers used to protect items during shipping, such as bubble wrap or packing "peanuts," *see* Attachment 4) manufactured or imported by the industry also qualify as articles under TSCA. All of these articles may contain LCPFAC and PFAS chemical substances because these substances may be used in the manufacture of these articles. Furthermore, these semiconductor components are ubiquitous components in electronic devices of all sorts: computer and computer peripherals, TVs, phones, digital watches, wearable technology, cars, most kitchen appliances, LED light bulbs, "chip-based" identification cards, and thousands of other types of devices. Each contains a semiconductor chip, so any could also contain a tiny amount of a LCPFAC or PFAS chemical substance that would be subject to reporting. Accordingly, SIA requests that EPA maintain the article exemption for both of the LCPFAC and PFAS chemical substance categories.

While SIA members apply considerable resources to understand the chemicals that are present in their supply chains, including imported articles, we remind

EPA that companies are not legally required to know the identity of chemicals present in imported articles as no certification is required under TSCA Section 13 regulations nor do the new chemical regulations under TSCA Section 5 apply to chemicals present in imported articles.[11] SIA knows that LCPFAC and PFAS chemical substances have been used historically, including over the past 15 years, in the manufacture of tools and semiconductor components that were subsequently imported into the U.S. While this use has declined over the past 15 years, the survey results support that LCPFAC and PFAS chemical substances continue to be used in the manufacture of such imported articles and very likely remain present in the articles at least at trace levels when imported. While we cannot specify which chemicals continue to be used in which articles, we remind EPA that, as established above, industry is not legally required to know this either generally or with any certainty. The surveys demonstrate that such importation is ongoing now and our members expect it will continue in the foreseeable future, although at diminishing levels as alternatives are discovered and found to be viable. Until such a time that our members and their suppliers can ensure that LCPFAC and PFAS chemical substances are not present in articles, the importation of semiconductor manufacturing articles must be excluded from coverage under the SNUR as a currently legal and ongoing commercial activity. As an ongoing commercial activity, importation of such articles cannot be made subject to a SNUR. If EPA has a need to establish the current situation regarding the presence of LCPFAC and PFAS chemical substances in imported articles, EPA can use other authorities under TSCA to gather such information.

[11] 40 C.F.R. § 704.5.

a. Articles: Semiconductor Devices and Packaging

Because of the use and presence of chemical substances covered by the proposed SNUR in semiconductor manufacturing processes, LCPFAC chemical substances may be present in finished semiconductor devices or packages that are manufactured or imported. For example, LCPFAC chemical substances may be present after soldering using a solder flux that contains a LCPFAC chemical substance. Similarly, an adhesive that uses a LCPFAC chemical substance as a release agent is used during the assembly of a semiconductor "package" (*i.e.,* the final housing used to protect a semiconductor and connect it to a circuit board; see Attachment 4). The adhesive may contain residual LCPFAC chemical substances and therefore the fully assembled package may contain residual LCPFAC chemical substances.

SIA requests that, in the final rule, EPA exempt semiconductor articles, including finished semiconductor components and packages, as well as articles that contain semiconductor components and packages.

b. Articles: Semiconductor Manufacturing Equipment

SIA members import or purchase domestically semiconductor manufacturing equipment ("tools"), parts, fab infrastructure equipment, and ancillary equipment. These tools, parts, and equipment are considered articles under TSCA. All of these articles may contain LCPFAC and PFAS chemical substances because, due to the specific chemical and physical attributes of these chemicals, these substances may be used in the manufacture of these articles.

For example, a part found in semiconductor manufacturing equipment may include poly(tetrafluoroethylene) (PTFE) gaskets. LCPFAC and PFAS chemical

substances may be used to process PTFE or other fluoropolymer substances used in manufacturing that gasket, and as such, may remain as residuals in the gasket. As PTFE and other fluoropolymers are critical materials in these parts, to the extent that they contain LCPFAC and PFAS chemical substances, SIA members will continue to purchase tools, parts, and ancillary equipment that will or may have LCPFAC and PFAS chemical substances present. These articles that may contain LCPFAC and PFAS chemical substances are specialized industrial equipment and, thus, are not sold to consumers, limiting the potential for releases or exposures.

Similarly, LCPFAC chemical substances may be present in fluoropolymer materials used in other aspects of semiconductor manufacturing. For example, hoses that connect chemical supply containers to tools, as well as the storage containers themselves, are likely made of or with chemically resistant fluoropolymers. As with the parts of tools, these fluoropolymers may have residual amounts of LCPFAC chemical substances.

SIA surveyed semiconductor equipment manufacturers and other suppliers about the presence of LCPFAC and PFAS chemical substances in equipment and parts (see Attachment 3). Thirty-four companies responded and nearly 90 percent indicated that the substances of interest are or may be present in the tools and other articles they supply to SIA members. Some respondents indicate that PFAS and LCPFAC chemical substances, including perfluorooctanoic acid (PFOA) and its salts, and telomer-containing substances are present in their products. Most responded that they do not know if the LCPFAC chemical substances are present because of the complexity of the supply chain. This lack of certainty is due to the fact that tools are

assembled from many thousands of parts. Any part that includes a chemically resistant fluoropolymer (for example, a coating, seal, or gasket) may have residual amounts of a LCPFAC chemical substance that may have been used to manufacture that fluoropolymer. The fluoropolymer manufacturer may be many steps removed from the SIA member company who purchases a tool, or even from the equipment manufacturer who supplies the product to an SIA member, making it very difficult for SIA members to attest with specificity to the presence or absence of LCPFAC chemical substances in a tool or a component part. The current proposed amendment to 40 C.F.R. § 721.10536 designates that import of fluoropolymers containing PFOA and its salts as part of articles shall not be considered a new use. This covers most chemical substances contained in articles used by the semiconductor industry, but, as the survey indicates, other LCPFAC chemical substances, including PFOA and telomer substances, are or may be present in articles. These substances may be present intentionally as part of a chemically resistant coating, or as residuals from an earlier process that employed a LCPFAC chemical substance. It is essential that the final rule exempt semiconductor articles, including semiconductors, semiconductor components and packages, and the manufacturing tools, equipment, parts, or components used to produce semiconductors and semiconductor components and packages.

SIA Request on Articles

To this end, SIA respectfully requests that EPA maintain the exemption under 40 C.F.R. § 721.45(f) for articles used in the semiconductor industry. This would include but not be limited to semiconductor devices, components, or packages, semiconductor manufacturing tools, parts, materials, ancillary equipment, and

infrastructure used during semiconductor manufacturing that contain or may contain LCPFAC and PFAS chemical substances. SIA recommends that EPA maintain, in proposed § 721.10536(b)(4)(iii), the sentence "Import of fluoropolymer dispersions and emulsions, and fluoropolymers as part of articles, containing chemical substances identified in paragraph (b)(3) of this section shall not be considered as a significant new use subject to reporting." In addition SIA recommends that EPA add "The provisions of §721.45(f) continue to apply for articles used during or articles produced by semiconductor manufacturing or processing and articles that contain semiconductor components or packages." before the sentence "The other provisions of §721.45(f), respecting processing a chemical substance as part of an article, remains applicable." in the proposed language at § 721.10536(c)(1).

Conclusion

For the reasons discussed above, EPA cannot issue a SNUR for SIA members' specific, ongoing uses for LCPFAC and PFAS chemical substances identified in the proposed SNUR. Furthermore, EPA cannot issue a rule limiting SIA members' ongoing acquisition, importation, and use of articles such as semiconductor manufacturing parts, materials, and equipment, or SIA members' ongoing importation of semiconductor components or packages that may have been manufactured with, and may contain residual amounts of LCPFAC or PFAS chemical substances. EPA also cannot issue a rule limiting SIA members or others from manufacturing or importing articles that include semiconductor components or packages that may contain LCPFAC or PFAS chemical substances.

SIA appreciates the opportunity to submit these comments on behalf of its members and welcomes the opportunity to discuss these issues with EPA further.

Sincerely,

David Isaacs

Vice President, Government Affairs

Semiconductor Industry Association

cc: **Wendy Cleland-Hamnett, Director, OPPT**

Jeff Morris, Deputy Director, OPPT

Attachment 1: Chemicals Innovation and the US Semiconductor Industry. Semiconductor Industry Association.

Attachment 2: 2015 Semiconductor Lithography Supplier PFAS Survey Results. Prepared for the Semiconductor Industry Association by Laurie S. Beu Consulting (March 26, 2015).

Attachment 3: 2015 LCPFAC-PFOA in Articles Supplier Survey Results. Prepared for the Semiconductor Industry Association by Laurie S. Beu Consulting (April 21, 2015).

Attachment 4: Illustration of semiconductor and semiconductor package.