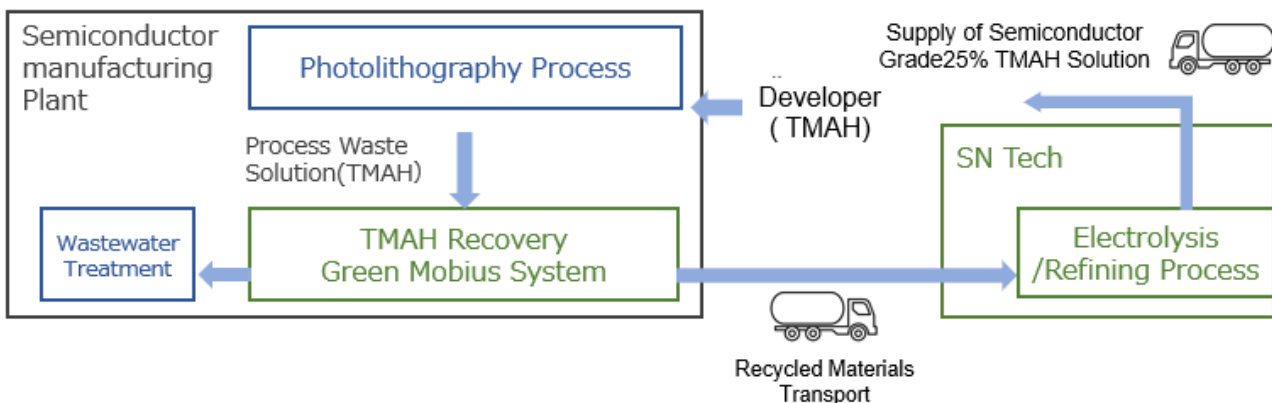


Commercialization of Collection and Recycling of Developer Used in Semiconductor Manufacturing

The NAGASE Group’s Nagase & Co., Ltd. (Chiyoda-ku, Tokyo; Representative Director, President and CEO: Hiroyuki Ueshima) and Nagase ChemteX (Head office: Osaka; President and CEO: Satoru Fujii) which is involved in the semiconductor business, along with SACHEM, Inc. (President/CEO Rosemary Hoffman), will begin a project to collect and recycle the high-purity developer used in the manufacture of semiconductors (tetramethylammonium hydroxide: TMAH). The plan for this project is for SN Tech Corporation, a joint venture among the three companies involved in the recycling of developer, to introduce electrolysis and refinement technology in a new plant to be built in Higashiosaka. This will be the first example in the semiconductor field in Japan of collecting TMAH waste solution, recycling it, and reusing it as TMAH. There are also plans for SN Tech to manufacture and sell its Green Mobius System, which collects developer waste solution for use as a raw material, for semiconductor plants.

The semiconductor chip manufacturing process is separated into the front-end and back-end processes. In the front-end process photolithography is repeated in order to create circuits on silicon wafers. During photolithography a high-purity developer (semiconductor grade TMAH) is necessary to create the circuits. The back-end process is where the silicon wafers are transformed into semiconductor chips. The recycling of TMAH requires the difficult process of collecting, reprocessing, electrolysis and refining, to return to semiconductor grade. This technology is anticipated to relieve some environmental burden and increase profitability of the semiconductor manufacturing industry.



SN Tech has been collecting and recycling the developer used in the manufacture of LCD panels since 2008. This new project will apply the technology and knowhow SN Tech has cultivated until now towards establishing a model case for the reuse of TMAH, which requires more advanced electrolysis and refining technologies. With this project enabling the reuse and stable procurement of TMAH and water in semiconductor manufacturing plants, as well as reducing the energy used, it should lead to improved profitability in the semiconductor industry, where there has been increasingly aggressive cost competitiveness, and allow for the creation of sustainable, environmentally conscious business models,



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a pressing need for businesses around the world. The plan calls for manufacturing 10,000t of high-purity developer in Japan annually. Using this business model as a model case, the goal is to expand not just within Japan, but overseas as well, leading to further expansion of semiconductor-related businesses.

By using materials to solve production challenges, the NAGASE Group will contribute to bringing about a sustainable world where people live with peace of mind.

■Nagase & Co. Overview

Company name : Nagase & Co., Ltd.

Location of Head Office : Tokiwabashi Tower, 2-6-4, Otemachi, Chiyoda-Ku, Tokyo

Representative Director : Hiroyuki Ueshima

Description of Business : Import/export and domestic sales of chemicals, plastics, electronics materials, cosmetics and health foods.

URL : <https://www.nagase.co.jp/english/>

■Nagase ChemteX Overview

Company name : Nagase ChemteX Corporation

Location of Head Office : 1-1-17 Shinmachi, Nishi-ku, Osaka

Representative Director : Satoru Fujii (President and CEO)

Description of Business : Production and sale of high-performance resins including denatured epoxy resins, Photolithography material, epichlorohydrin derivatives, acrylic polymers, Conductive coating materials, chelating agents, disinfectants and antimicrobial agents, and enzymes/phospholipids

URL : <https://www.nagasechemtex.co.jp/en>

■SACHEM, Inc. Overview

Company name : SACHEM, Inc.

Representative Director : President/CEO Rosemary Hoffman

Description of Business : Manufacturing the high-purity developer used in the manufacture of semiconductors etc.

◆Inquiries

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