Macro Porous Polymer Sorption (MPPS)

The route to solvent removal and recovery in the semiconductor industry

VEOLIA

Macro Porous Polymer Sorption (MPPS)

The chip fabrication industry is one of the most water-intensive industries, estimated to use millions of liters per day for its processes. Apart from the significant amount of water needed, the effluent created presents an even greater challenge. Solvents used to clean wafers often contaminate wastewater streams with crystalline silicon sludge, fragments as well as dangerous additives like hydrofluoric acid and copper sulfate solution.

Isopropyl alcohol (IPA) is one such solvent that has stringent requirements for discharge as it is a potential environmental hasard. The industry is constantly faced with challenges in finding efficient solutions when it comes to the removal and recovery of solvents from IPA waste streams. Often, these streams are treated using distillation or ultrafiltration/reverse osmosis (UF-RO) technologies, which are both cost, energy, and labor-intensive.

Macro Porous Polymer Sorption (MPPS) is a highly effective technology that:

- uses no chemicals
- produces no sludge or waste gas
- is fully automated
- consumes less energy
- requires minimal operator intervention

MPPS removes dissolved solvents with efficiency of 99.99%. This includes solvents such as:

- Isopropyl alcohol (IPA)
- Acetone
- MEK / MIBK
- DMF
- DMAc
- THF
- MTBE

UNLOCKING VALUABLE RESOURCES FROM WASTEWATER

Solvent recovery for new possibilities: concentrated solvents can be reused for other processes or sold as a valuable resource.

Optimising water efficiency: save on ultrapure water production while reducing fresh water intake from water reuse.

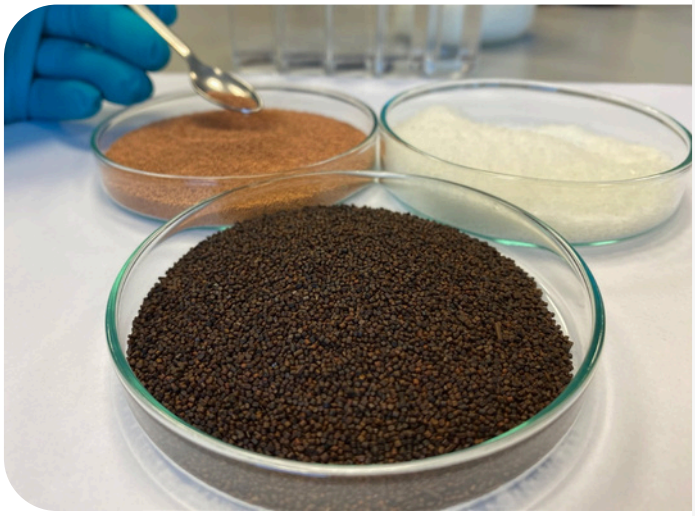
Controlled IPA weight percentage for compliance: enhance plant performance by adjusting IPA concentration levels in the stream to achieve optimal results while meeting safety regulations.

Performance assurance without budget surprises: our Performance Guarantee Service (PGS) ensuresthe functionality of the media at a fixed annual fee.

Designed with modularity in mind: the MPPS units can be tailored for installation in spaces with significant size constraints. For example, a basement with minimal access.

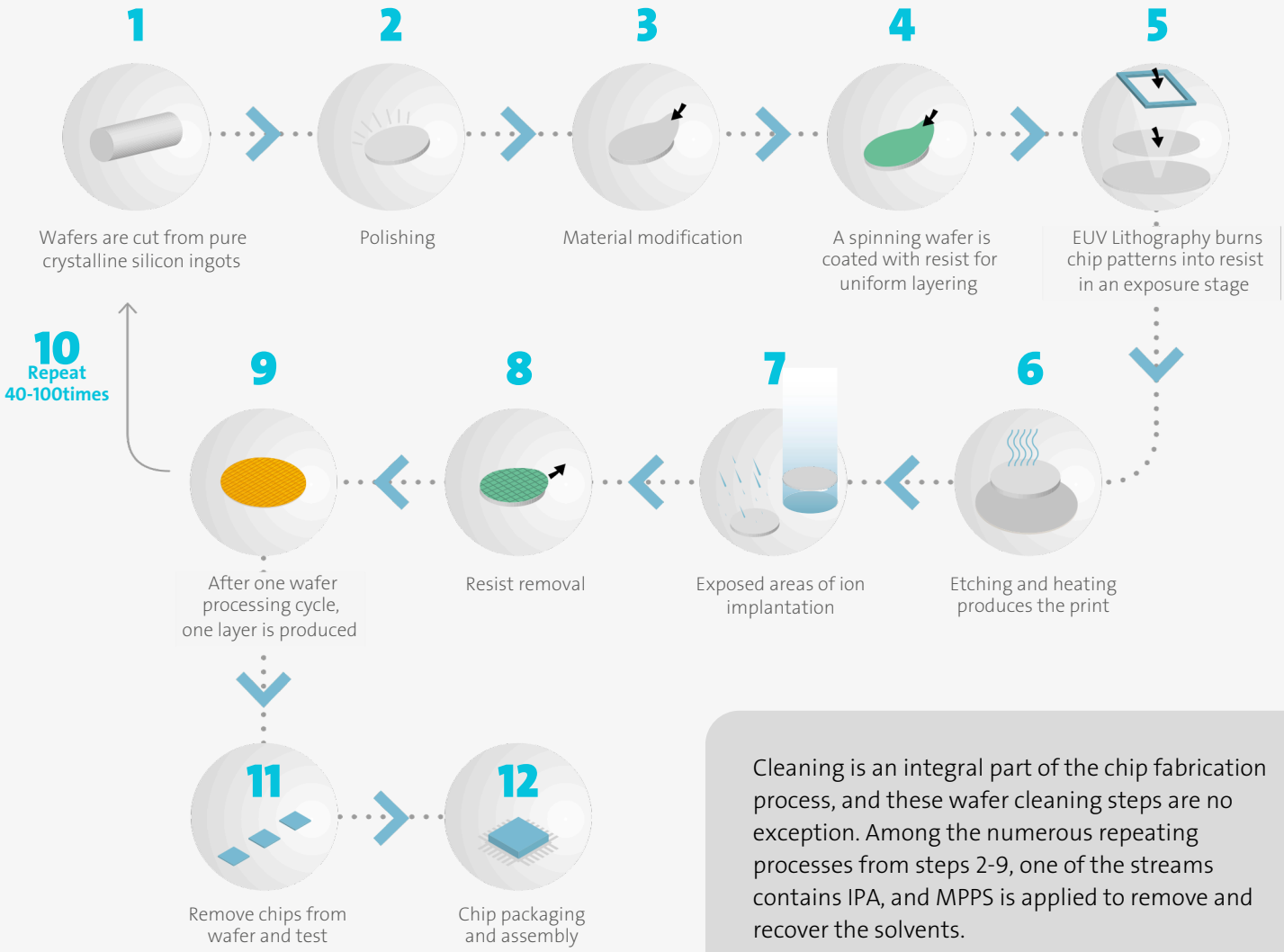
WHY SORPTION RATHER THAN EXTRACTION?

Macro Porous Polymer Extraction (MPPE) is a liquid/liquid extraction system in which the extraction liquid is immobilised in porous polymeric particles. These particles will contain up to 70% of the volume of the extraction liquid. When feed water is in contact with the MPPE media, solvents migrate from the water into the extraction liquid. However, polar components, like IPA, have a low affinity for the extraction liquid. As a result, a new type of media has been applied that is based on sorption rather than extraction and is therefore indicated as MPPS. The process in which the two types of media are used is identical and has been used for decades in other industries, specifically oil and gas.



Various types of media.

THE ROLE OF MPPS IN THE FABRICATION PROCESS



Cleaning is an integral part of the chip fabrication process, and these wafer cleaning steps are no exception. Among the numerous repeating processes from steps 2-9, one of the streams contains IPA, and MPPS is applied to remove and recover the solvents.

MPPS COMPARED TO ALTERNATIVE TREATMENTS

CRITERIA	MPPS	UF-RO	BIOTREATMENT	DISTILLATION
FOOTPRINT	Very compact	Large Multiple unit operations	Large	Compact More height may be required
ENERGY CONSUMPTION	Low	High	Medium	Max
SLUDGE PRODUCTION	⊗	⊗ RO concentrate must be disposed of or concentrated further	✓	⊗
POTENTIAL FOR REUSE	✓	⊗ Polluted with salts	⊗ Solvents are converted into sludge and CO_2	✓
COMPLEXITY OF THE PROCESS	One-step process	Two unit operations in series, often with two stages of RO	Includes sludge recovery, nutrient dosing, and biomass vulnerability	Usually multistage

SERVICES

- Performance guarantee services (PGS) - media supply
- Hubgrade digital services
- Spare parts

Containerised pilot unit.

DEPLOYMENT OF MPPS: FROM CONCEPT TO SOLUTION

Concept

In just a week, we can create a preliminary concept with a cost estimate based on your needs

Lab tests and pilot

Validation throughin-house lab tests and then with a potential onsite pilot trial to ensure a successful concept

Ongoing Performance Guarantee Service (PGS)

Receive clarity and assurance with an annual expenditure overview including an ongoing PGS for media supply

Remote capabilities

Operational support is made easier with remote control and monitoring enabling you to take charge from anywhere

Turnkey delivery of the proposed solution

Select from our standardised solutions to quickly deploy the proposed solution or customise a solution tailored to your industry and requirements

THE HOME OF HYDROCARBON REMOVAL TECHNOLOGIES

MPP Systems has more than 40 years' of experience in the removal of hydrocarbons, like oily substances and solvents from water. Our extensive range of solutions has been designed and successfully proven over decades in several industries. Whether choosing customised or standardised systems, our expertise allows us to meet client and industry demands for water treatment.

Our solutions are supported by lab testing, pilot trials, media exchange and spare parts supply ensuring long-term satisfaction. With Veolia's portfolio, we can cover the entire water treatment process, from pre- treatment to post-treatment, for greater flexibility and full compliance.

INDUSTRIES	APPLICATION	POLLUTANT	TECHNOLOGY
Oil and gas - upstream	Treatment of gas produced water	BTEX	Extraction
Oil and gas - upstream	**Treatment of oil produced water**	**Oil and solids**	**Coalescence / filtration**
Pharmaceuticals and semiconductors	Solvent removal and recovery	Solvents	Extraction / sorption
Various	**Runoff water deoiling**	**Oil and solids**	**Gravimetric techniques**
Petrochemicals	Removal of specific components	Multiple	Extraction / sorption
Various	**Groundwater remediation**	**Chlorinated organics**	**Extraction**

Resourcing the world

Veolia - Water Tech trading as VWS (Ireland) Ltd.,
Dublin Road, Donaghcumpur, Celbridge, Kildare W23 AX07,
Ireland,
01 630 3333
www.veoliawatertechnologies.ie