



Solutions You Need. Technologies You Trust.



NITTO DENKO





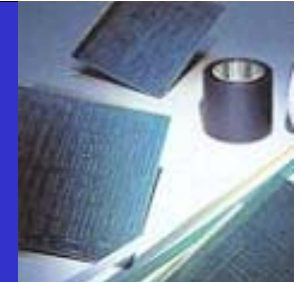
**Semiconductor
Related
Products**



**Flexible Printed
Circuits**



Packaging Products



**Masking Tapes
for Printed
Circuits**

Electrical Materials

Tape Materials

Nitto Denko Polymer Synthesis Technology



**Surface Protection Tapes
for Automotive Industry**

**First ever
Therapeutic
Patches for**



Specialty Products

Optical Related Products

**Engineered
Plastics**



**RO/NF/UF/MF Membrane
Products**



**Liquid Crystal
Display Film for
Improving Light
Transmittance**

Nitto Denko – Hydranautics: Solutions You Need. Technologies You Trust.

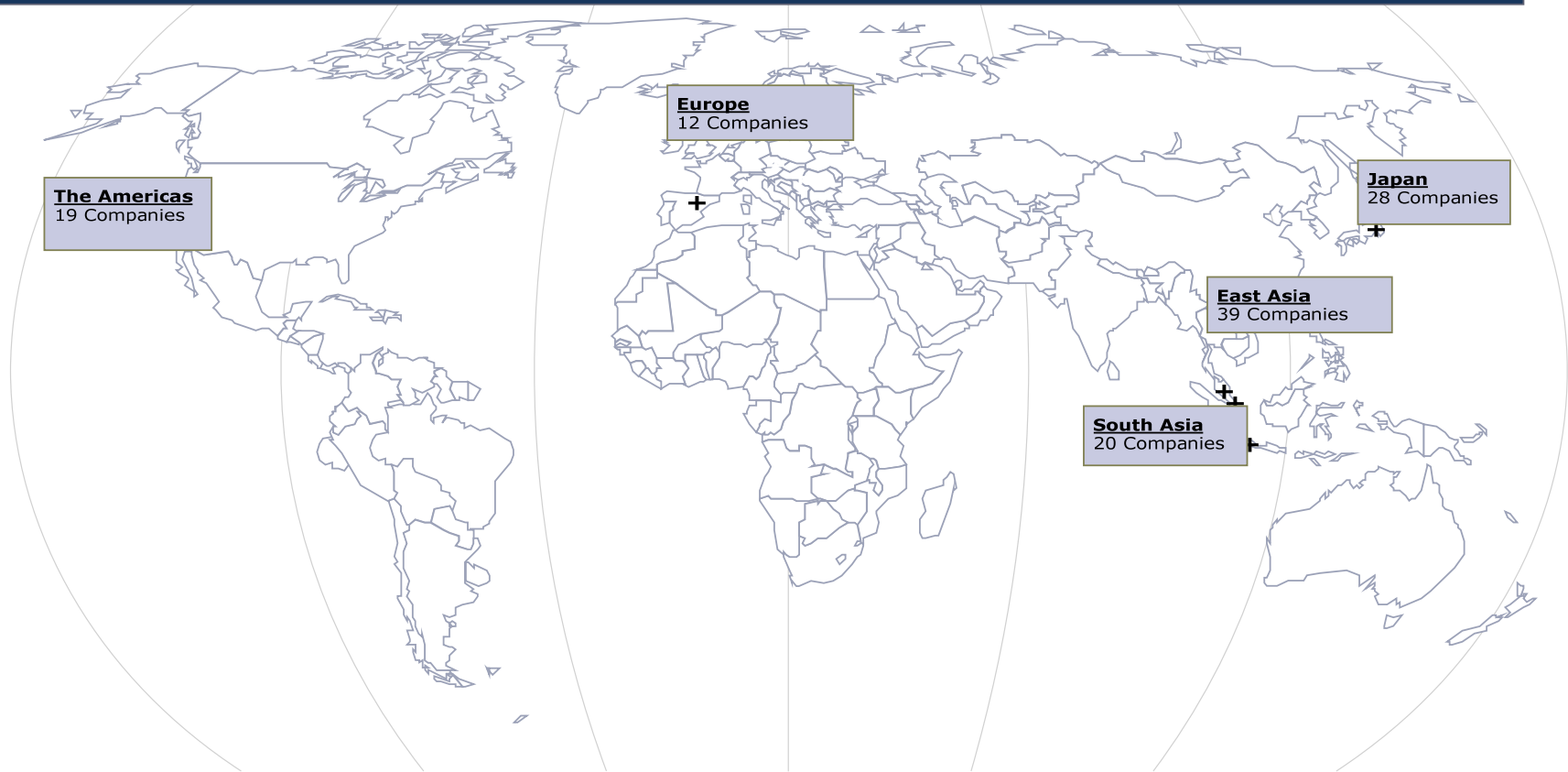


- 🔹 **Seawater Desalination**
- 🔹 **Industrial High-Purity Water**
- 🔹 **Surface Water Treatment**
- 🔹 **Waste Water Treatment**
- 🔹 **Specialty Process Applications**



Hydranautics is a A Nitto Denko Company

The Nitto Denko Family of Companies has a global presence with 118 companies and annual sales exceeding \$7.5 Billion USD.



Leveraging Nitto Denko Membrane Group Global Manufacturing Synergy for Customer Success



Shiga, Japan
Founded: 1986
Site Area: 73,000 m²
(60% expansion begun 2008)



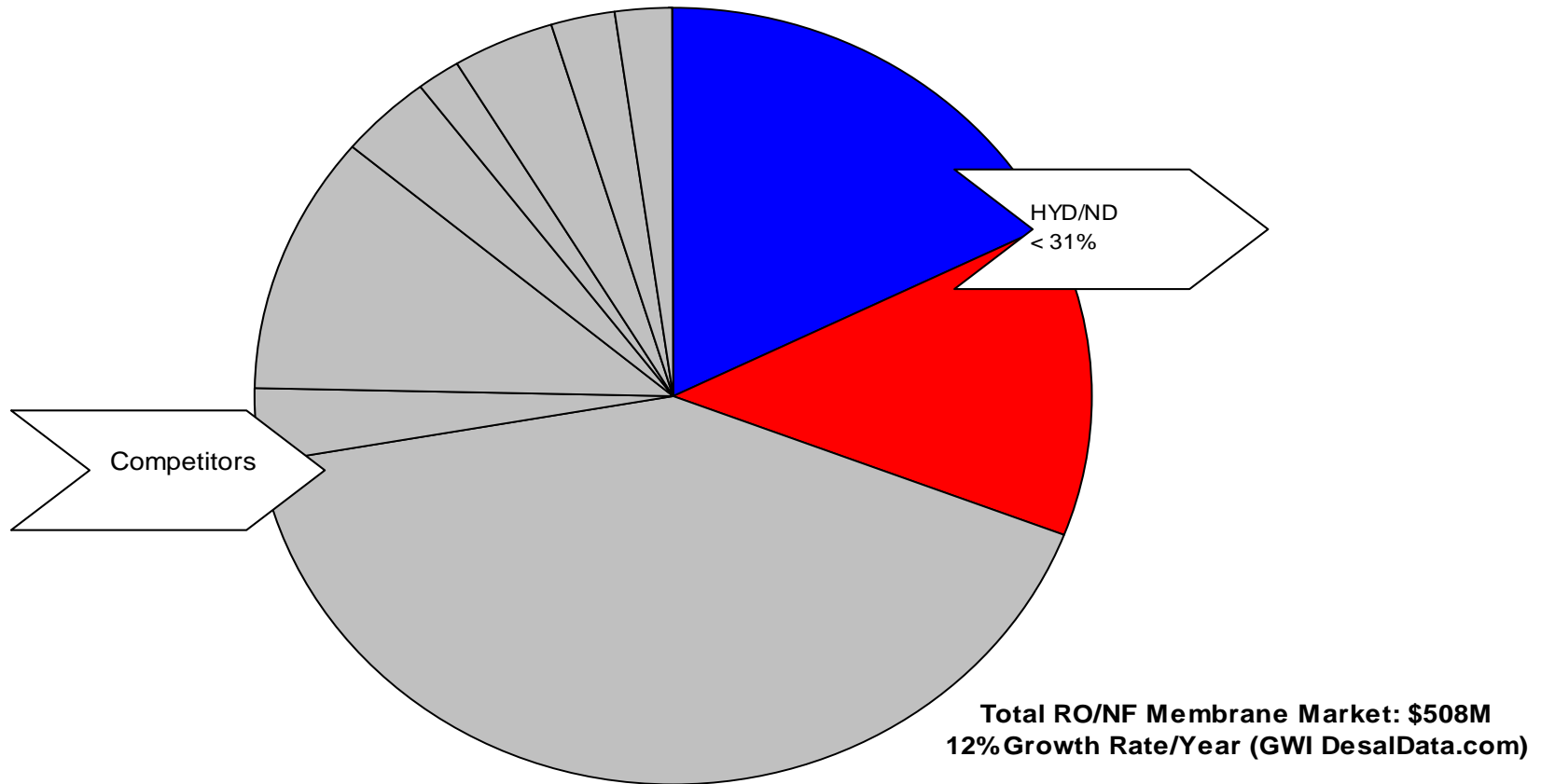
Hydranautics
Founded: 1963
Site Area: 14,900 m²



Nitto, Shanghai
Founded: 2001
Site Area: 16,000 m²



Nitto Denko- Hydranautics Market Share: RO/NF FY2007



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TECHNICAL

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PRODUCTS

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- [SWC](#)
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Membranes are our business concern, and leading

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Membranes

Seawater Membranes



SWC 4

Price:
\$ 775.00

[+ details](#)
[+ add to cart](#)

Seawater membranes



SWC 3

Price:
\$ 775.00

[+ details](#)
[+ add to cart](#)

Shopping cart:

now in your cart **0 items**

Product

[Brackish Water High Rejection Membranes \(CPA\)](#)

[Brackish Water Ultra Low Pressure Membranes \(ESPA\)](#)

[Seawater Membranes SWC](#)

Information

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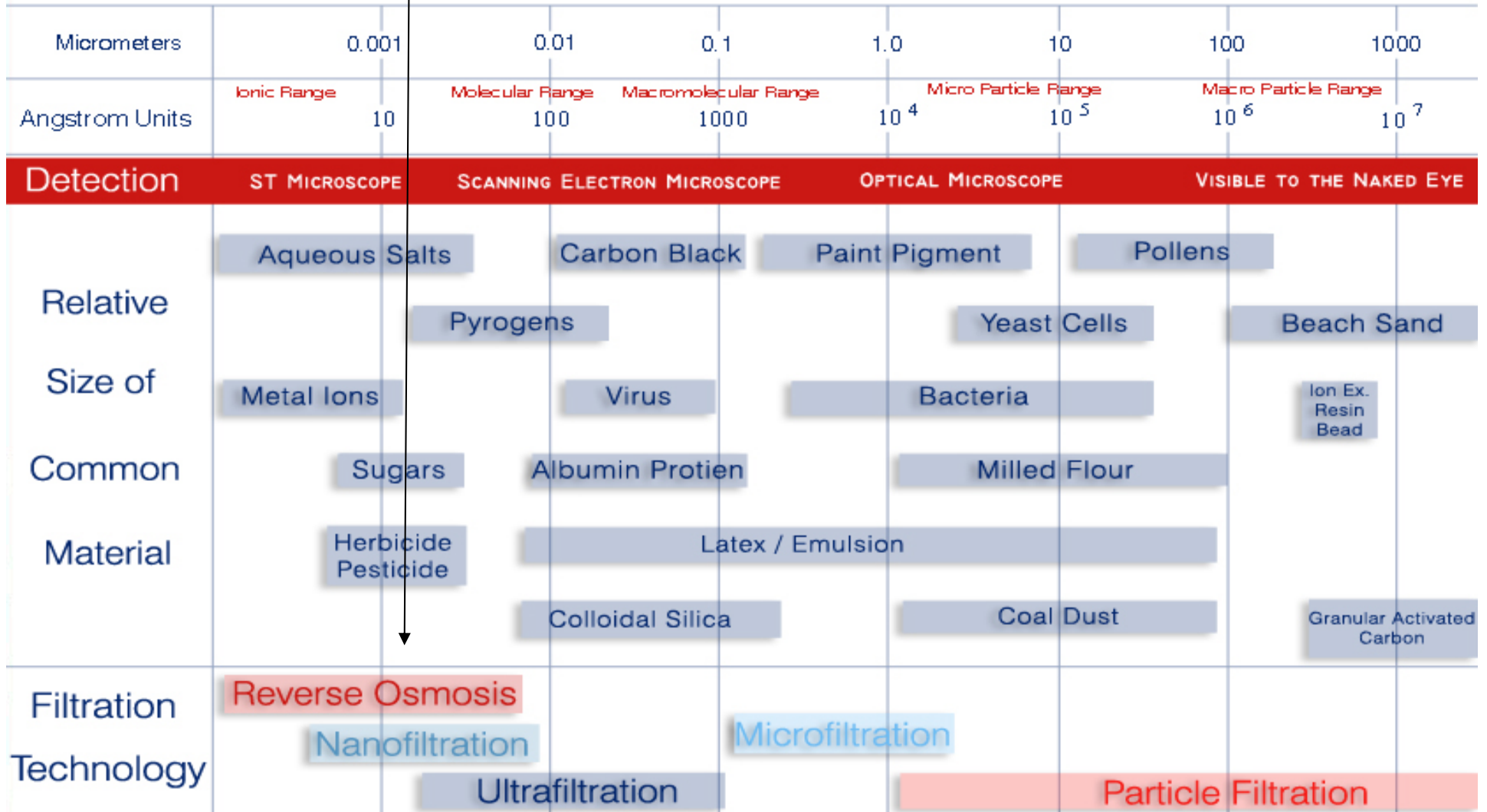
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Brackish Water RO



Filtration Spectrum

CPA[®] - High Rejection Membranes



- 🔴 **Developed in 1989 – The Membrane Industry Benchmark Performer**
- 🔴 **Highest combined salt rejection and productivity**
- 🔴 **Applied Pressure at 225 psi**
- 🔴 **Complete product line to fit any application:**
 - CPA2 – 4040 (2,250 gpd, 99.5% avg. rejection)
 - CPA3 (11,000 gpd, 99.7% avg. rejection)
 - CPA3-LD (11,000 gpd, 99.7% avg. rejection – low fouling)
 - CPA5-LD (11,000 gpd, 99.7% avg. rejection – low fouling, low operating pressure)



Over 300 MGD of CPA installed capacity Worldwide



- Kill Devil Hills, NC.....2 MGD (7,600 m³/d) of potable water
from a brackish well water source
- City of Brighton, CO.....6 MGD (20,000 m³/d) of potable water
from a brackish well water source
- Englewood Water District, FL.....4 MGD (15,000 m³/d) of potable water
from a brackish well water source



ESPA® – High Productivity Membranes



- Developed in 1995 - 1st ever low energy membrane
- High productivity and high rejection
- Applied Pressure @ 150 psi
- Available to fit large application spectrum
 - ESPA1 (12,000 gpd @ 99.2% avg. rejection)
 - ESPA2 (9,000 gpd @ 99.6% avg. rejection)
 - ESPA2+(12,000 gpd @ 99.6% avg. rejection)
 - ESPA2-LD (10,000 gpd @99.6% avg. rejection)
 - ESPA4* (12,000 gpd @ 99.2% avg. rejection) *Tested at 100 psig
 - ESPAB (8,600 gpd @ 99.2% avg. rejection)
 - ESPAB+ (9,000 gpd @ 99.3% avg. rejection)



Over 400 MGD **ESPA** of installed capacity worldwide



Ulu Pandan, Singapore.....45 MGD (170,000 m³/d) of industrial water from a wastewater source

West Basin, CA.....5 MGD (19,000 m³/day) of industrial water from a wastewater source

Orange County, CA.....70 MGD (265.000 m³/d) of reclaimed wastewater for a seawater intrusion barrier



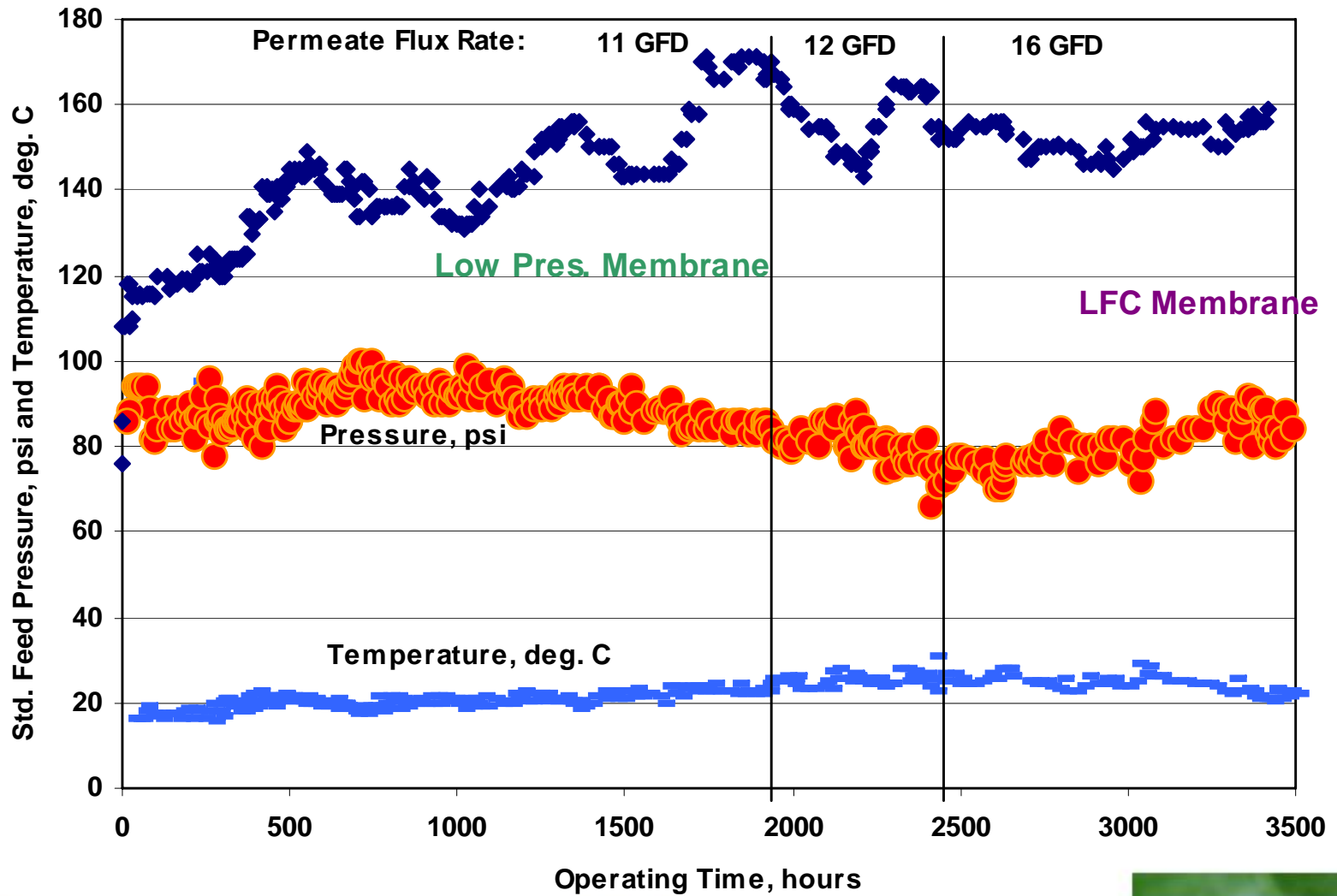
LFC[®] – True Hydrophilic Membrane Chemistry



- Superior treatment of difficult feedwater and wastewaters
- Applied Pressure, 225 psi
- Signature low-fouling product:
 - LFC3-LD (11,000 gpd @ 99.7% avg. rejection)
 - High rejection and productivity with flux stability for highly polluted water



LFC Vs. Low Pressure Membrane Operation on Municipal Effluent Treated with Capillary UF Pretreatment



Over 40 MGD of LFC installed capacity Worldwide



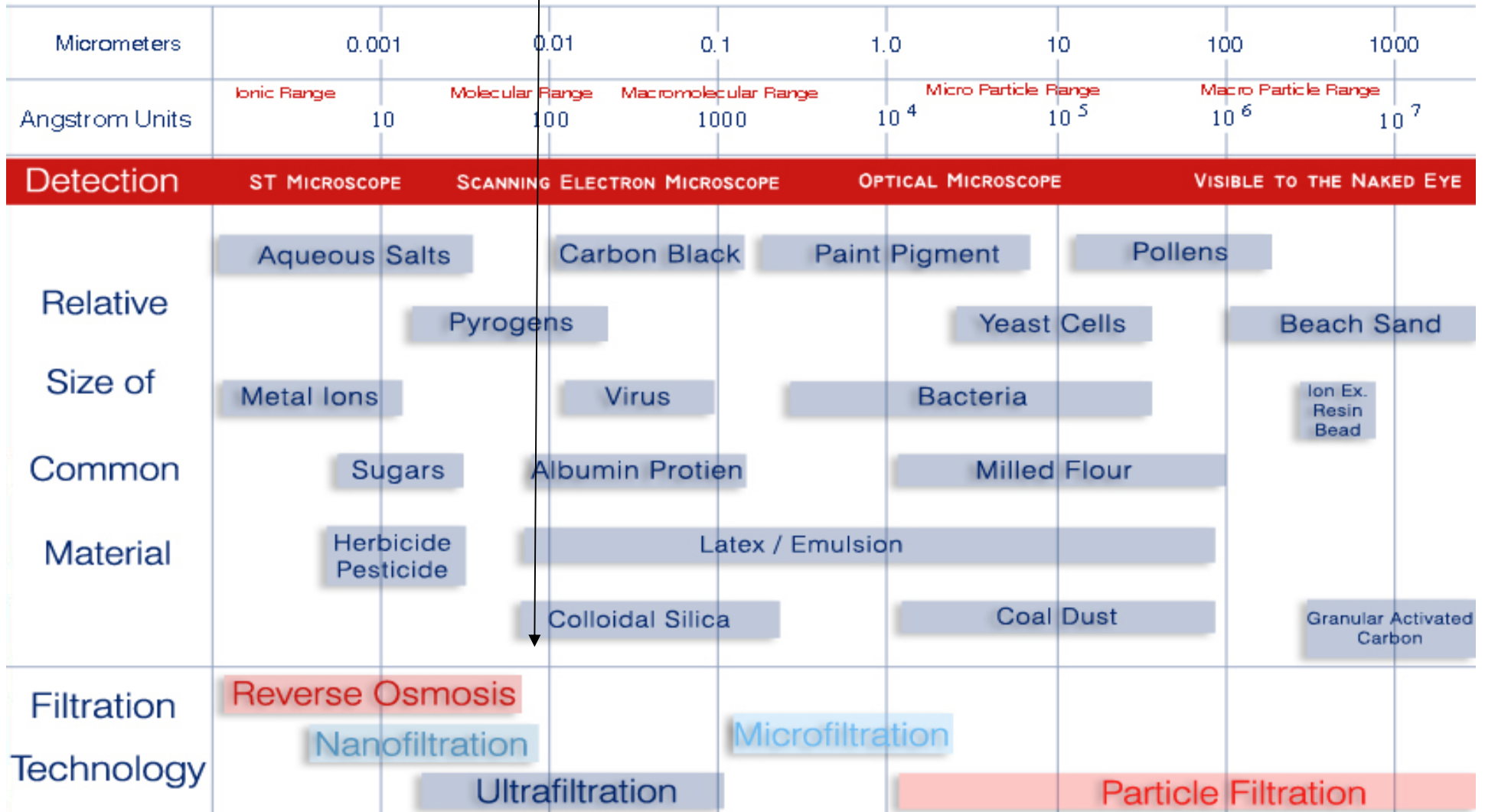
Bedok, Singapore.....8.5 MGD (32,000 m³/day) of industrial water from a wastewater source

Kranji, Singapore.....10.5 MGD (40,000 m³/day) of industrial water from a wastewater source

La Solana, Spain.....1.3 MGD (4,800 m³/day) of industrial water from a surface water source



Nanofiltration:



Filtration Spectrum

ESNA[®] – Energy Saving Nanofiltration



- **Nanofiltration Membranes**
- **Removal of organics, color, iron, bacteria & viruses**
- **Rejection between 70-98%, ion dependent**
- **Applied Pressure, 75 psig**
- **Available membrane elements**
 - ESNA1-LF (8,200 gpd @ 91% avg. rejection)
 - ESNA1-LF2 (10,500 gpd @ 86% avg. rejection)



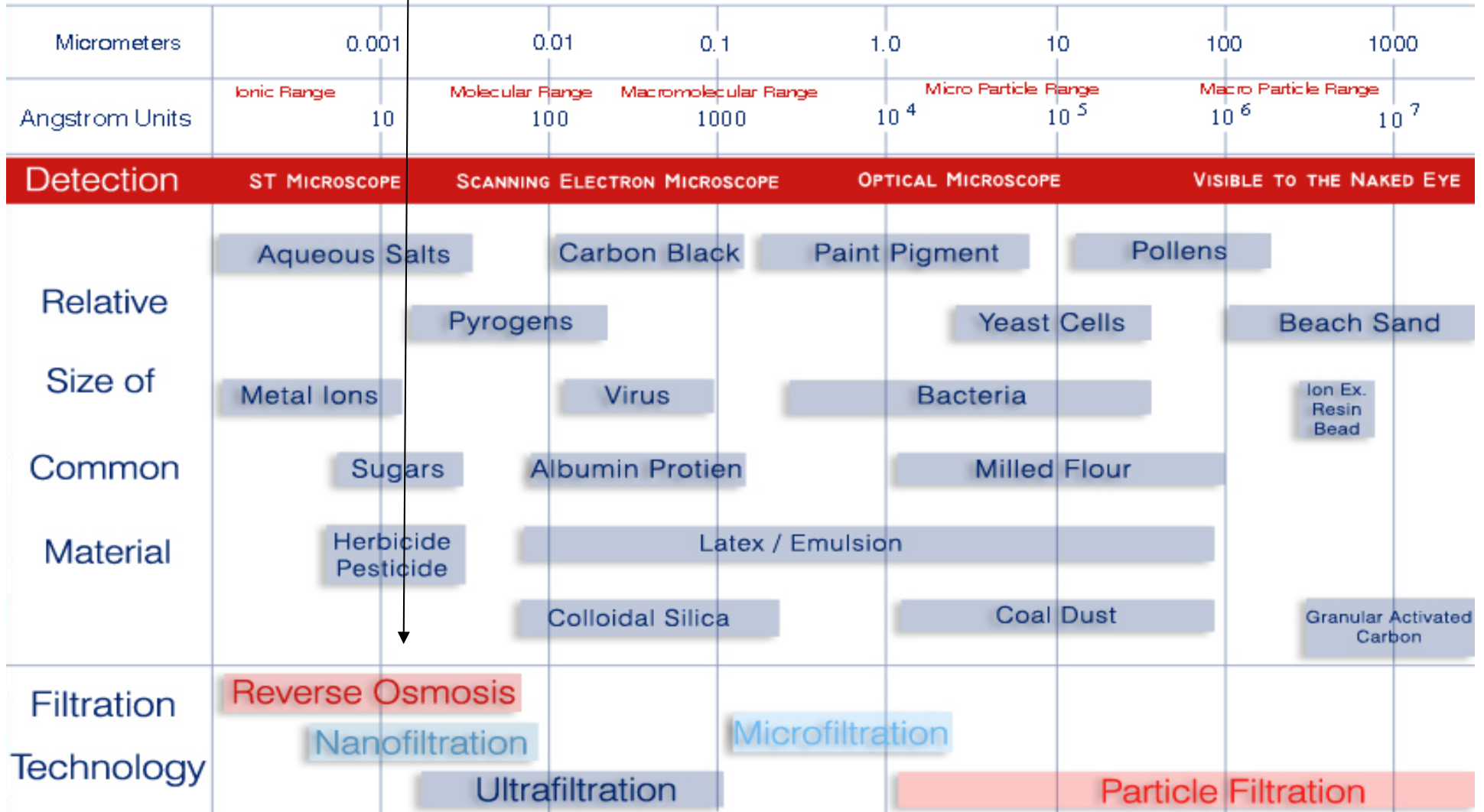
Over 100 MGD of **ESNA** of installed capacity worldwide



- Boca Raton, FL.....40 MGD (152,000 m3/d) of potable water
from a well water source**
- Hollywood, FL.....18 MGD (68,000 m3/d) of potable water
from a well water source**
- Deerfield Beach, FL.....12 MGD (46,000 m3/d) of potable water
from a well water source**



Seawater RO:



Filtration Spectrum

SWC[®] – Purifying the Oceans of the World



- Highest levels of salt rejection in the industry
- Designed to accommodate varying levels of seawater salinities
- Reliable, field-proven performance
- Available Membrane Elements
 - SWC4+ (6,500 gpd, 99.8% avg. rejection)
 - SWC4+B (6,500 gpd, 99.8% avg. rejection) – high boron removal
 - SWC4+ Max (7,200 gpd, 99.8% avg. rejection) – boron removal
 - SWC5 (9,000 gpd, 99.8% avg. rejection)
 - SWC5 Max (9,900 gpd, 99.8% avg. rejection)
 - SWC6 ((12,000 gpd, 99.8 rejection)



Over 2.7M m3/d (728 MGD) global SWC capacity worldwide

Select Recent SWC References:

Project Name/ End User/Location	Membrane Type	Year Comm.	(m3/day)	Application
Honaine, Algeria	SWC5 MAX	2010	200,000	Potable water
Beckton, BWRO - second stage with SWRO membranes	CPA3-SWC4+	2009	153,000	Potable water
AlHamriyah	SWC5	2009-2010	80,000	Potable water
Tlemcem, Algeria	SWC5	2010	200,000	Potable water
Chennai, India	SWC4+	2009	100,000	Potable water
Barcelona, Spain	SWC4+/SWC5/ESPAB	2009	200,000	Potable water
Fouka, Algeria	SWC4+ MAX	2009	100,000	Potable water
Barka 2	SWC5/ESPAB+	2009	125,026	Potable water
Oman Sur	SWC5/ESPAB+	2009	80,578	Potable water
Las Palmas III, Canary Island, Spain (Plant Upgrade)	SWC4+/SWC5	2008	75,000	Potable water
Gold Coast Desal Plant, Queensland, Australia	SWC5/ESPA2+	2007	133,000	Potable water
Skikda, Algeria	SWC5	2007	100,000	Potable water
Beni Saf, Algeria	SWC5	2007	200,000	Potable water
Escombreras, Spain	SWC4+/SWC5	2007	63,000	Potable water
Dhekelia, Cyprus	SWC5/ESPAB	2007	40,000	Potable water
Los Cabos, Mexico	SWC5	2006	17,303	Potable water
Antofagasta, Chile	SWC5	2006	34,000	Potable water

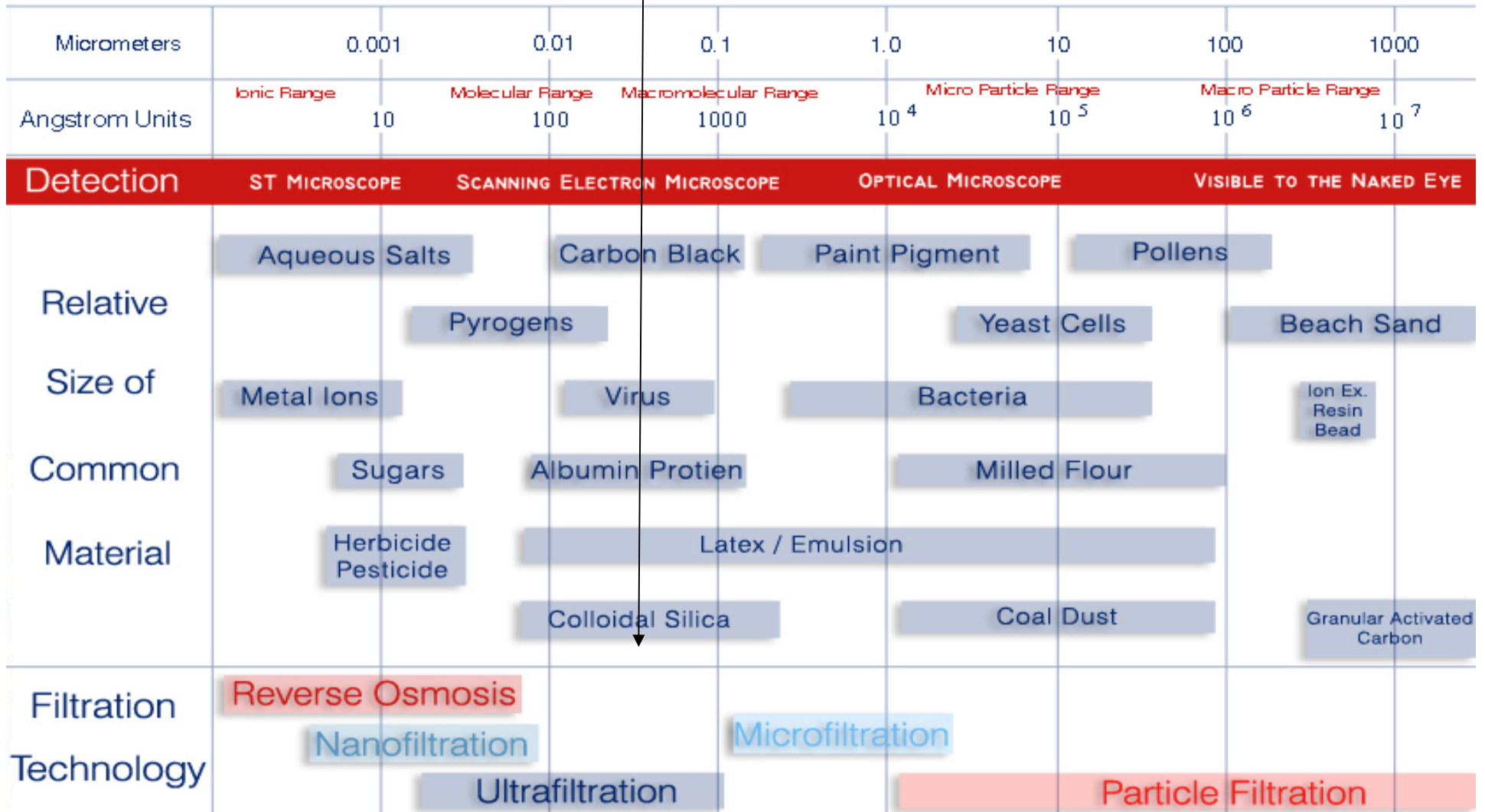


SWC[®] Specifications

Product	Area (sq ft)	Flow (gpd)	TDS Nominal Rej (%)	TDS Minimum Rej (%)	Boron Nominal Rej (%)
SWC4+	400	6500	99.83	99.7	93
SWC4+ Max	440	7200	99.8	99.7	93
SWC5	400	9000	99.8	99.7	92
SWC5 Max	440	9000	99.8	99.7	92



Ultrafiltration



Filtration Spectrum

HYDRAcap[®] and HYDRAcap[®]LD Superior Ultrafiltration Membrane Technology



HYDRAcap[®] Applications

- **Treatment of all surface water sources for both municipal and industrial applications**
 - Exceed SWTR (U.S.) & DWI (U.K.) requirements
- **Groundwater under the influence of surface water**
- **Backwash water recovery**
- **Pretreatment step to RO**
 - Seawater, city water and other water source



Over 190 MGD of HYDRAcap[®] installed capacity Worldwide

L'Hay Les Roses, France...39.6 MGD
(150,000 m³/d)

Nancy, France23.8 MGD
(90,000 m³/d)

Kindasa, KSA, IMS SWRO..14.9 MGD
(56,500 m³/d)

City of Two Rivers, WI.....3 MGD
(11,360 m³/d)

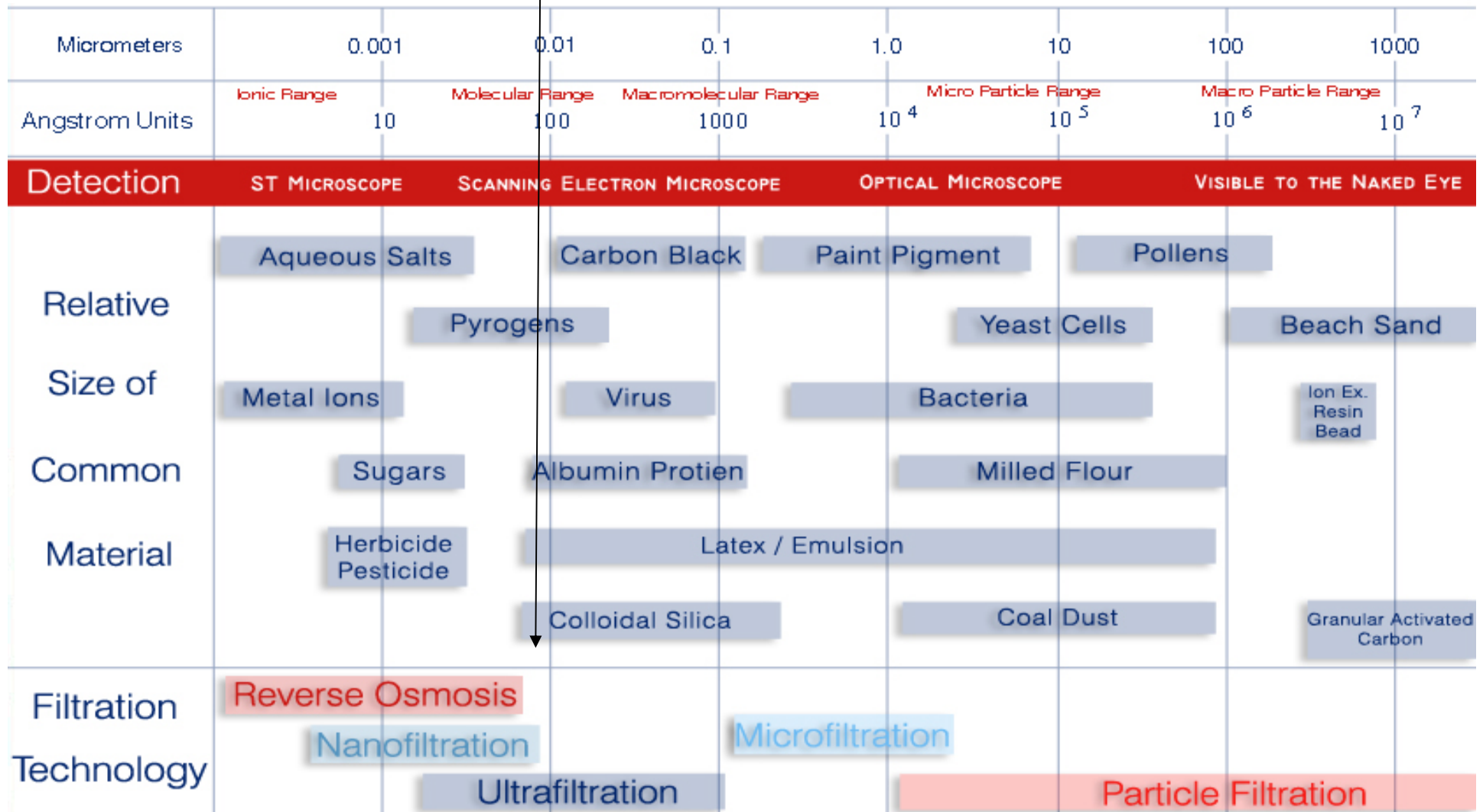
Cinergy Solutions, TX.....8 MGD
(30,300 m³/d)

Altus, OK6 MGD
(22,700 m³/d)

Bristol Water, UK.....4.8 MGD
(18,200 m³/d)



Special Applications



Filtration Spectrum

SanRO – Sanitary Membranes

- Maximum performance and Sanitizing Efficacy in USP Classified Water Systems
- SanRO-HS designed for sanitizing at 85° C
- SanRO-BIO / Pharmaceutical
 - SanRO CPA3 (10,500 gpd, 99.6% rej.)
 - SanRO HS (8,800 gpd, 99.7% rej.)
 - SanRO HS2 (14,000 gpd, 99.6% rej.)



Qualsep DairyRO

- Ideal for pre-concentrating milk or whey
- Provide maximum solids yields and effluent BOD reduction
- Each membrane is individually tested to ensure reliable field performance
- DairyRO-Whey, Milk Processing (50-55 C°)
- DairyUF- Whey Protein Concentration (50 C°)
 - DairyRO 3838-30 (30 gpm, 15 psig)
 - DairyRO 3840-30 (30 gpm, 15 psig)
 - DairyRO 8030-30 (80 gpm, 13 psig)
 - HydraPolish 8040-28 (80 pgm, 13 psig)



Nitto Denko Global Membrane Division



Shiga, Japan
Founded: 1986



Shanghai, China
Founded: 2001



Oceanside, USA
Founded: 1963



US \$70M Manufacturing Expansion – Shiga, Japan



completion due date : Summer 2009 Total floor area : 173,000 sqft





Shiga's Automation in Manufacturing since 1994



The new four-story/58,000 square foot Shiga production unit employs state-of-the-art coating and automation technologies.



NITTO DENKO



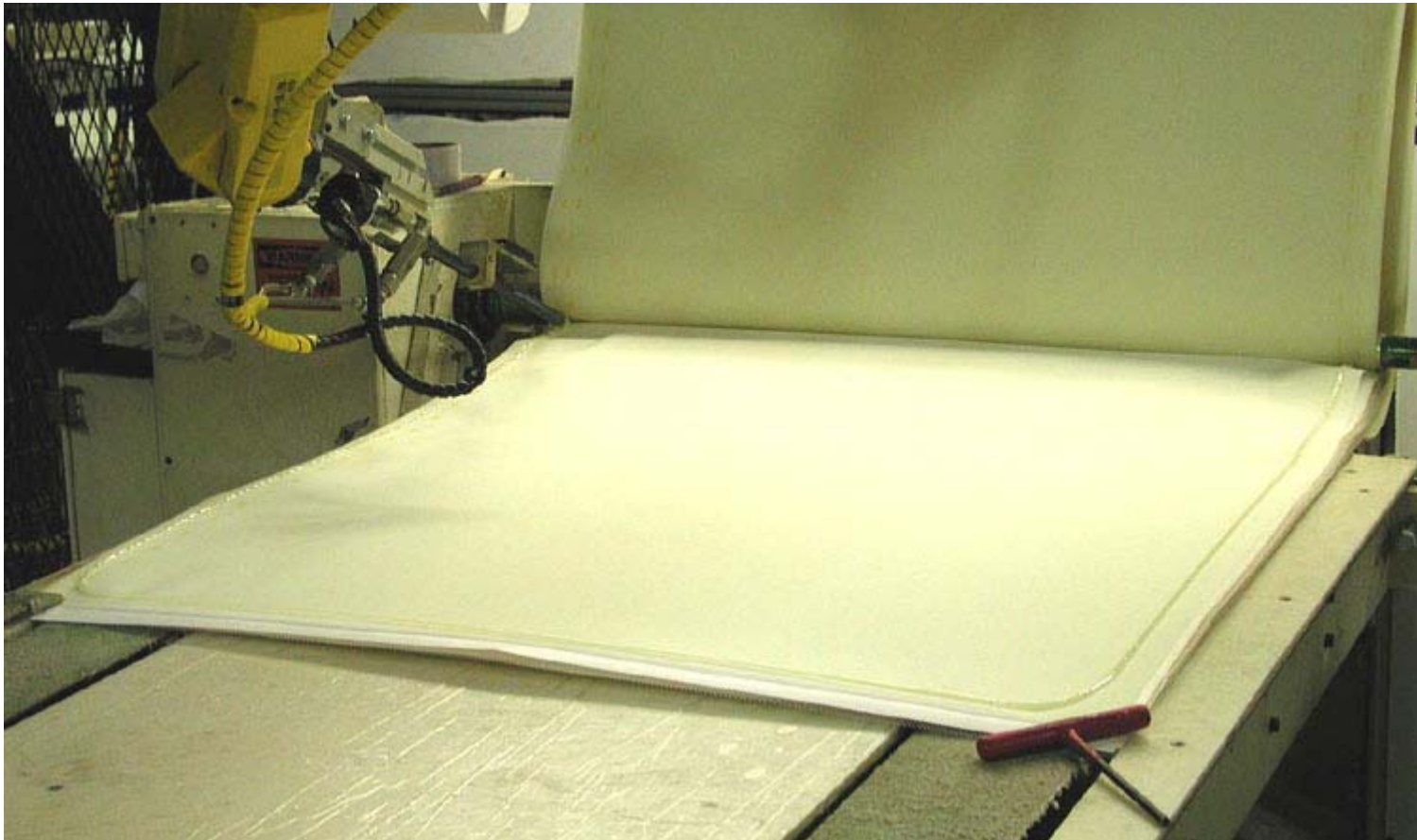
Jan. 2009

A Nitto Denko Company



State of the art automation...

ESPA2+ Made with Automated Element Manufacturing



9000 ESPA2+ for the Ulu Pandan Wastewater Plant



*As the Technology Leader...
we **focus** on Research & Development*



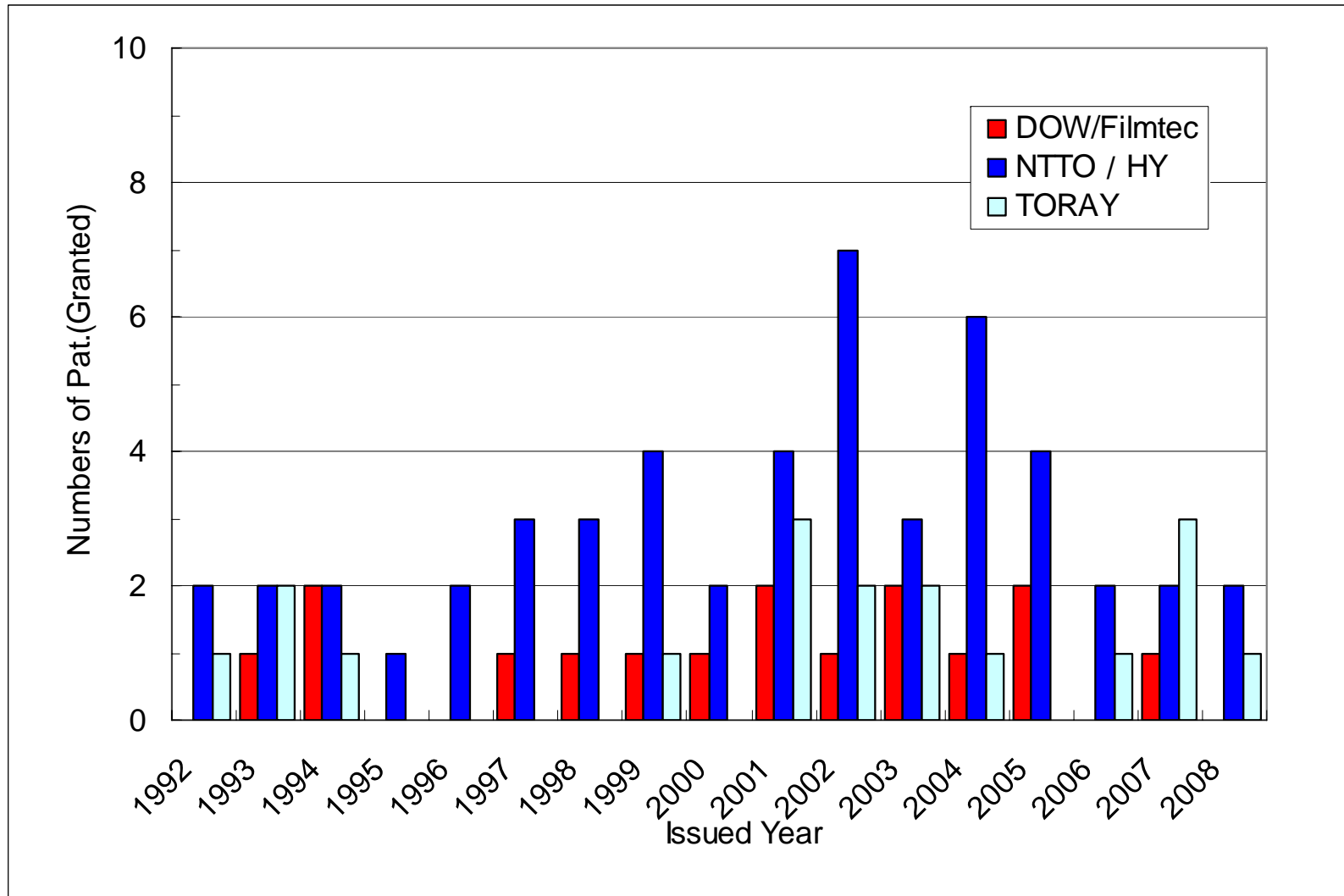
**3 R&D Centers U.S., Japan and Singapore
produce innovative technologies for
high performance membrane products.
Nitto Denko/Hydranautics invests 4.5% of
revenue on Research and Development.**



Hydranautics is one of the only membrane manufacturers to have ISO-9001 certification



US Patents Issued 1992-2008



HYDRANAUTICS: Service



Global Customer Support Worldwide



3 Manufacturing facilities ensure prompt deliveries.

Hydranautics' Worldwide Offices for Technical Support



US

- Oceanside
- Florida
- Texas

Europe/ME

- England
- Scotland
- UAE
- Spain
- France

Asia/Pacific

- Japan
- China
- India
- Australia



Hydranautics Support Services

- ① Process Review
- ① Product Use Documentation
- ① Delivery/Storage Inspection
- ① On-site Testing Support
- ① Installation Supervision Support
- ① Commissioning Support
- ① Troubleshooting



Service Contracts

- 🔹 **Two SWRO Plants: Carboneras and Marbella**
- 🔹 **Long-term Risk Sharing with Operator**
- 🔹 **Fee charged on \$/m³ of water produced**
 - **Replacement Element Management**
 - **Element Autopsy and Analysis**
 - **Process Reviews, including pretreatment**
 - **Cleaning Analysis and Recommendations**
 - **On-site Semi-Dedicated Technical Assistance**



Thank You
from
Nitto Denko - Hydranautics

Solutions You Need.
Technologies You Trust.

