SON

The next generation of smart nanoparticles

SOARES Pascal
Directeur commercial

+ 33 3 80 39 61 16
+ 33 7 66 84 63 16 (24/7 text)

p.soares@sonsas.com

SON SAS
9, Avenue Alain Savary - 21000 Dijon

www.sonsas.com

SON

The next generation of smart nanoparticles

www.sonsas.com

Siège social:
SON SAS
9, Boulevard Carnot
21000 DIJON

03 80 39 61 16

contact@sonsas.com

SIRET : 891 358 525 00014
TVA : FR54 891 358 525

Introduction

SONSAS
The next generation of smart nanoparticles

Designer and Producer

SON
The next generation of smart nanoparticles

SAS Catalysis

The Technology of RUPTURE for a greener catalysis with nano-particles

SON
The next generation of smart nanoparticles

SAS Environnement

Water treatment solutions

SONSAS

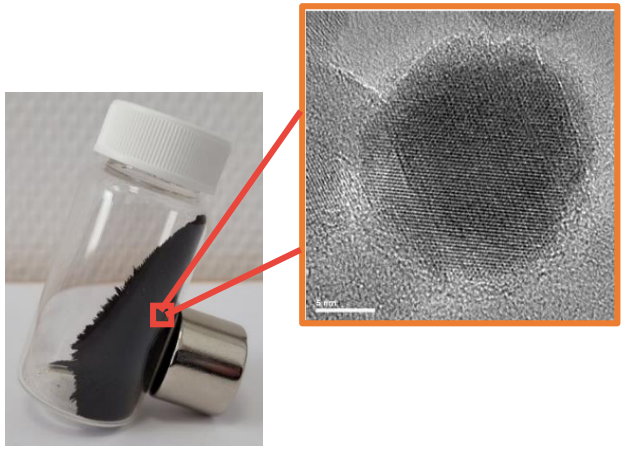
Designer and Producer

SON

The next generation of smart nanoparticles

Our Starting point = Iron oxide, J.Paris Thesis

Iron oxide nanoparticles
Fe_3O_4 , Magnetite
called SPIO (*SuperParamagnetic Iron Oxide)*



F.Tourinho, R.Frank, R.Massart, 1990
J.P.Jolivet et al, Chem. Comm, 2003
L.Maurizi et al, Chem. Commun, 2011

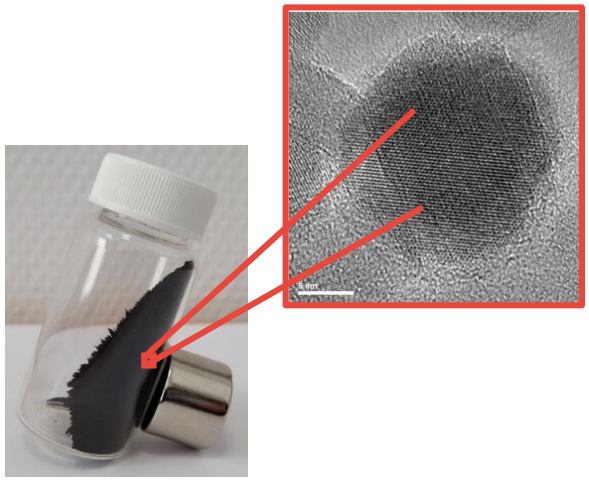
Synthesis of 1kg of SPIO

Control of Magnetic field

SON
The next generation of smart nanoparticles

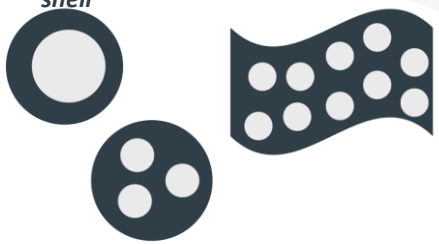
Our know-how = Core-shell / Functionalization of SPIO

Iron oxide nanoparticles
Fe_3O_4 , Magnetite
called SPIO (*SuperParamagnetic Iron Oxide*)



F.Tourinho, R.Frank, R.Massart, 1990
J.P.Jolivet et al, Chem. Comm, 2003
L.Maurizi et al, Chem. Commun, 2011

SPIO@SiO_2

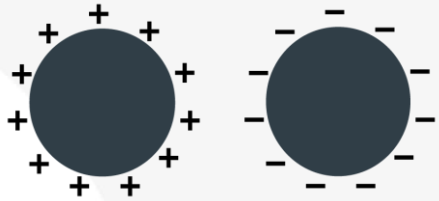


- *Thickness*
- *Concentration of SPIO inside the silica particles / matrix*

Protection layer increase the contact surface with the gel

C.Chanéac, J-P.Jolivet et al, J. Mater. Chem, 1996
H.L.Ding et al, Chem. Mater, 2012

Surface modification of SPIO



- *Control of charge Positive or Negative*

Stability with different pH

S.Liu et al Adv Cis, 2020

SON
The next generation of smart nanoparticles

Why our nanoparticles ?

Magnetic and can be used for MRI , Magnetic sorting....

Highly characterized
We garantie the grade

Reproductible and Identical batches

Recycling possible as designed to be iliminated

Biocompatibles
non-toxic

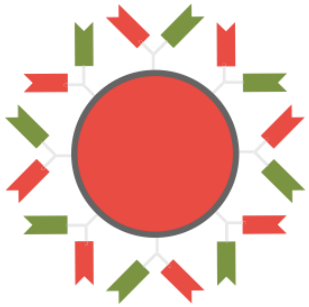
Bio-orthogonal Chemistry
Chemistry without catalyst

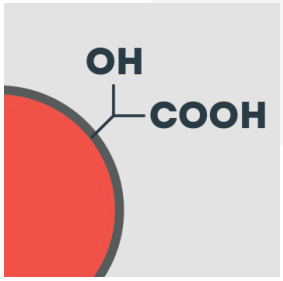
Several function Available

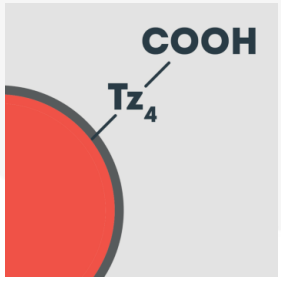
Bi-functionnality
Increase the possibilties

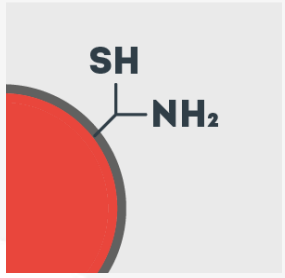
SON
The next generation of smart nanoparticles

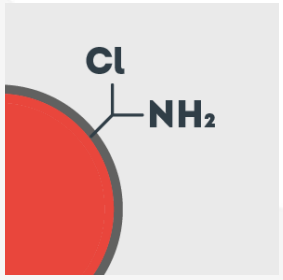
Examples from our catalog of nanoparticles

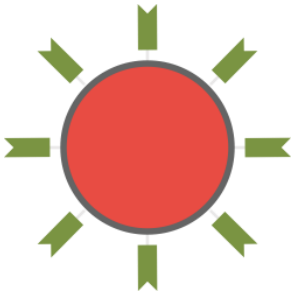


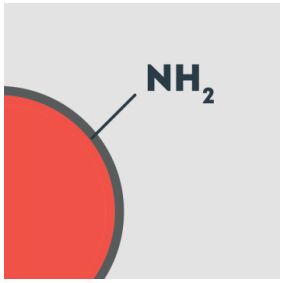


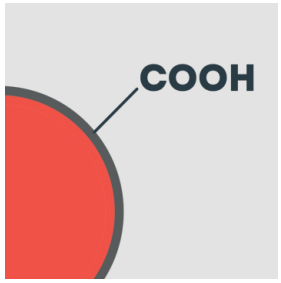


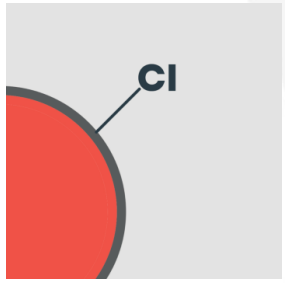


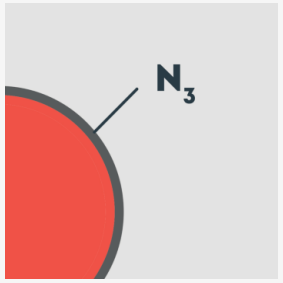












SON

The next generation of smart nanoparticles

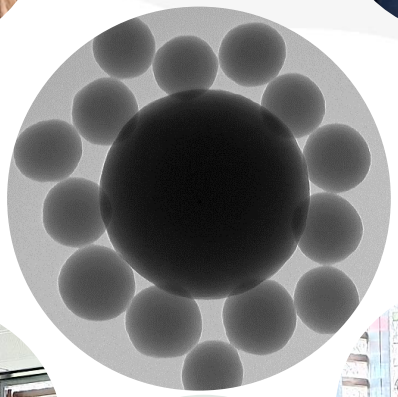
Our Team

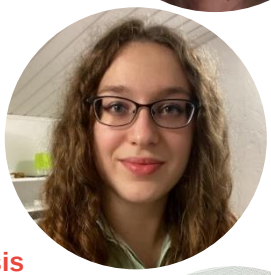
Over 30 years of combined expertise

Jeremy Paris
CEO - PhD, MBA

Richard Decréau
CSO – PhD

Chloé Gervasoni
CTO - Ms





Alizée Boullé
Ms, Nano-Catalysis

Polina Astafeva
Ms, Gold NP's

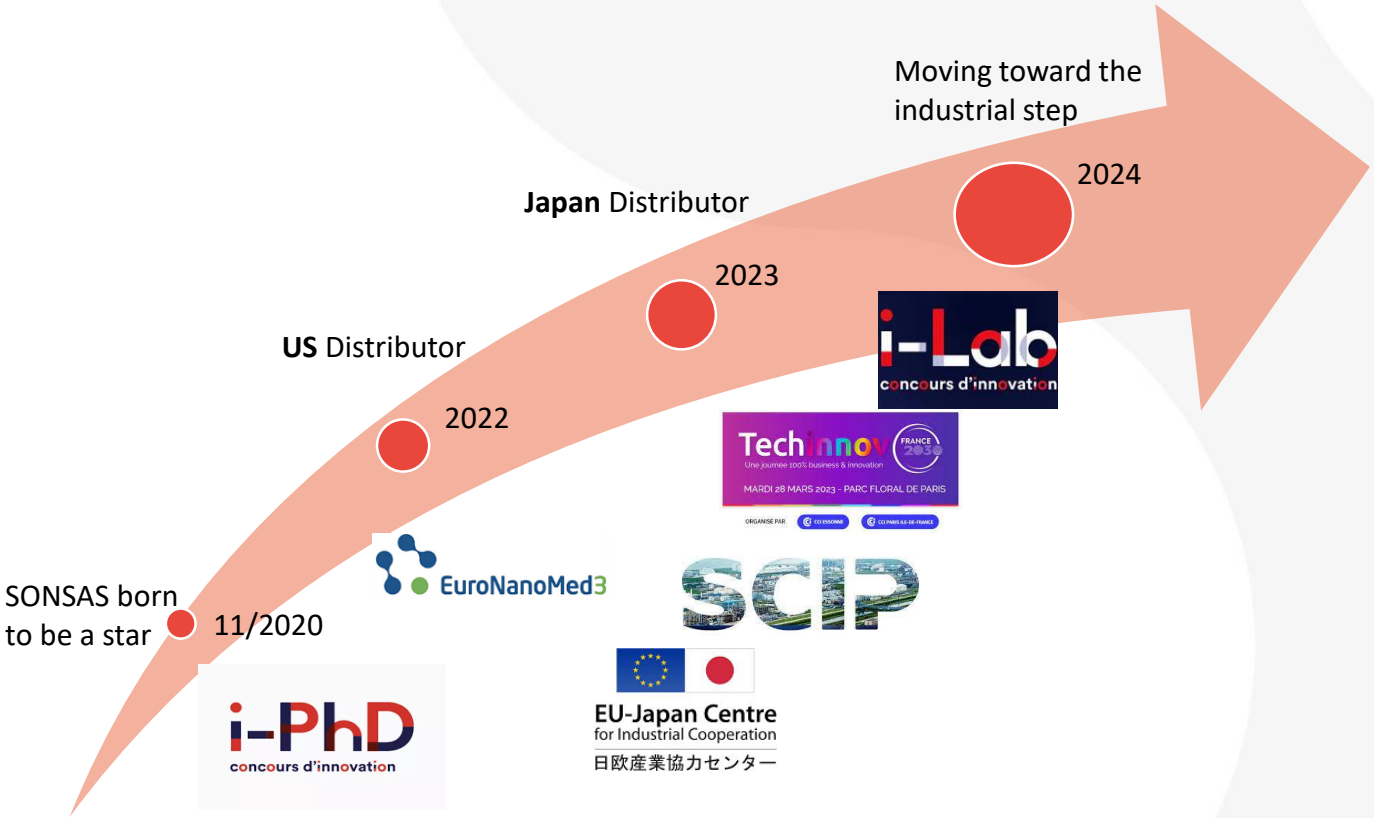
Vincent Ferreira
BI - Ma

Caroline Byun
PhD, Depollution

Pascal Soares
CBO – Ma

SON
The next generation of smart nanoparticles

SONSAS success story



SON
The next generation of smart nanoparticles

SONSAS

The technology of RUPTURE for a greener catalysis with nano-particles…

SON

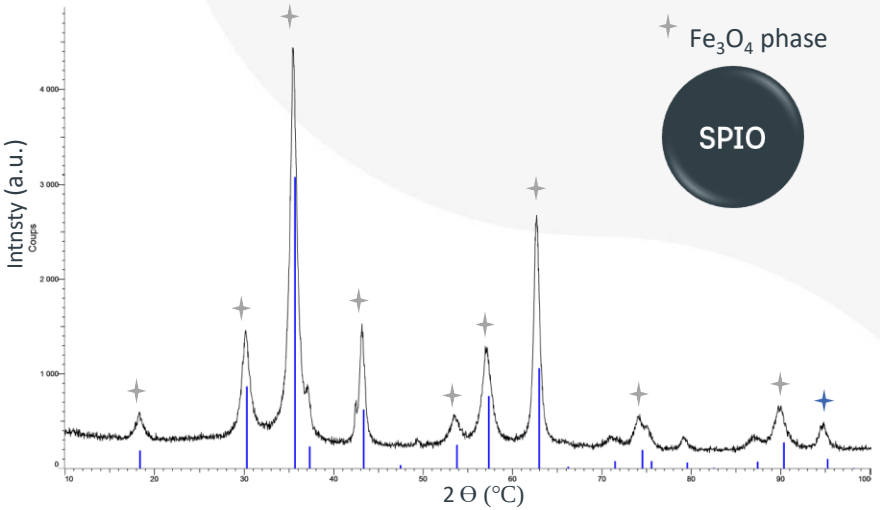
The next generation of smart nanoparticles

Synthesis of iron oxide nanoparticles

20L reactor

1 kg scale

SPIO = superparamagnetic iron oxide



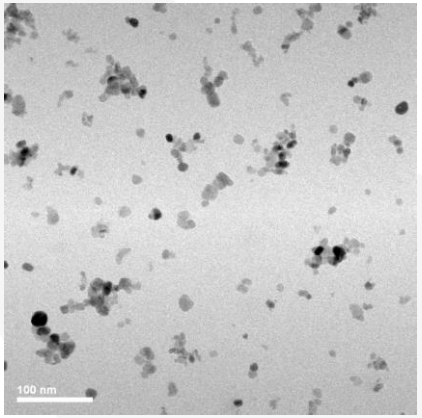
XRD results

d_{XRD} = (11 ± 1) nm

a = (8.377 ± 0.001) Å

Magnetite Mesh Parameters: a = 8.386 Å

Maghemite Mesh Parameters: a = 8.345 Å



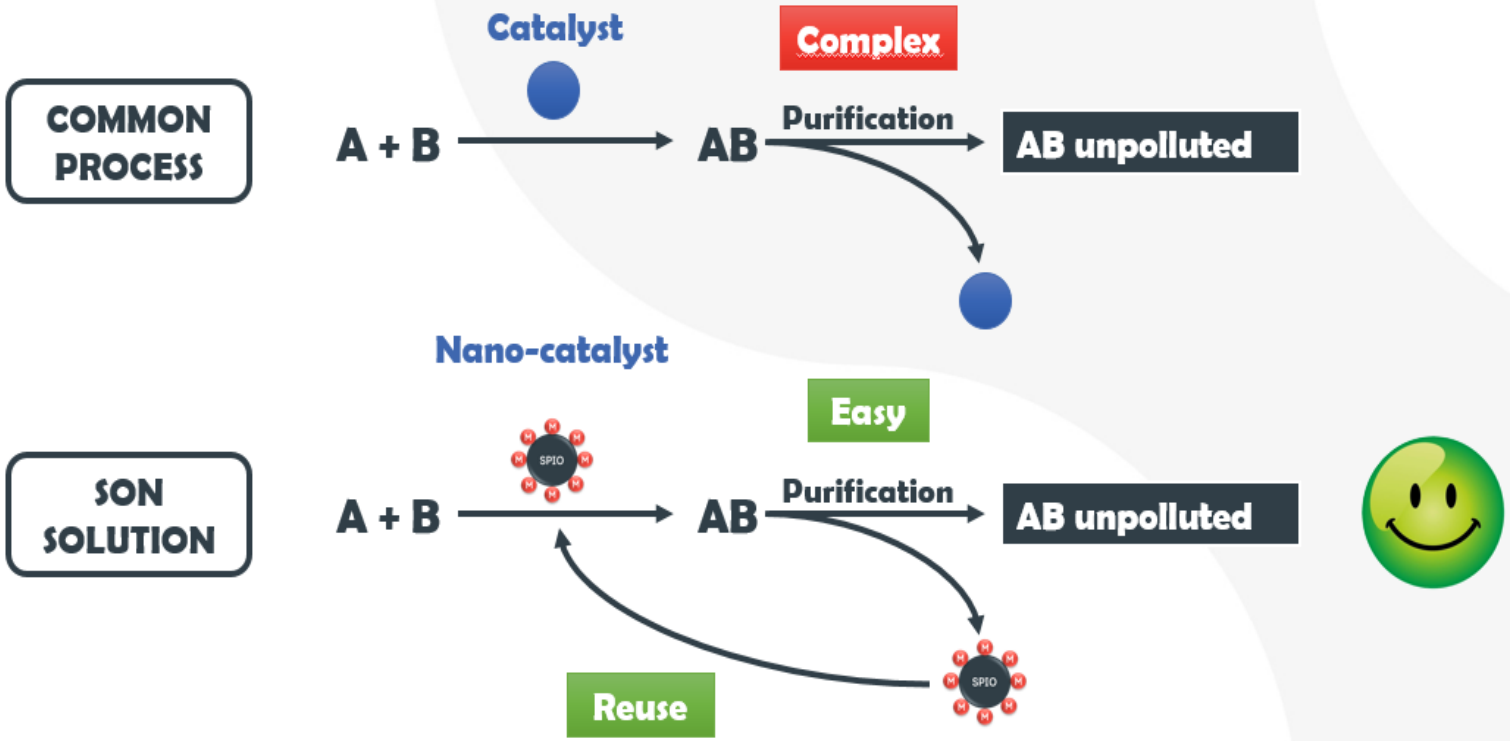
TEM results

Agglomerates: d_H = (30 ± 2) nm

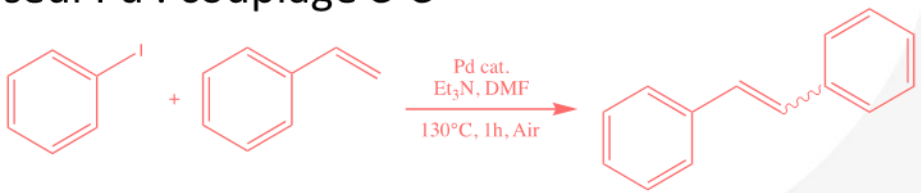
Specific surface: S_{BET} = (110 ± 1) m^2/g

The next generation of smart nanoparticles

From catalysis to the new nano-catalyse…



Exemple nanocatalyseur Pd : couplage C-C



%Pd	Pd mmol/g	Conversion	Run
0,1	0,35 - 0,40	> 95%	10

Eléments	Fe	Pd
Perte	< 1 ppm	2 – 3 ppm

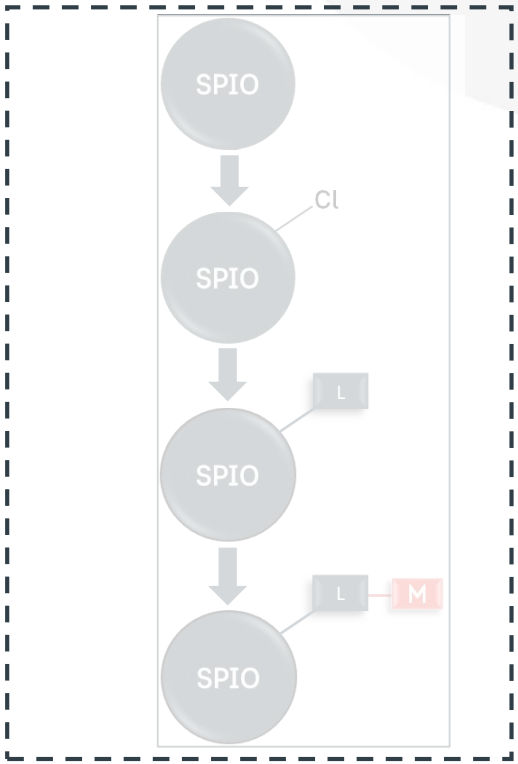
SON
The next generation of smart nanoparticles

New Synthesis method for nano-catalysts

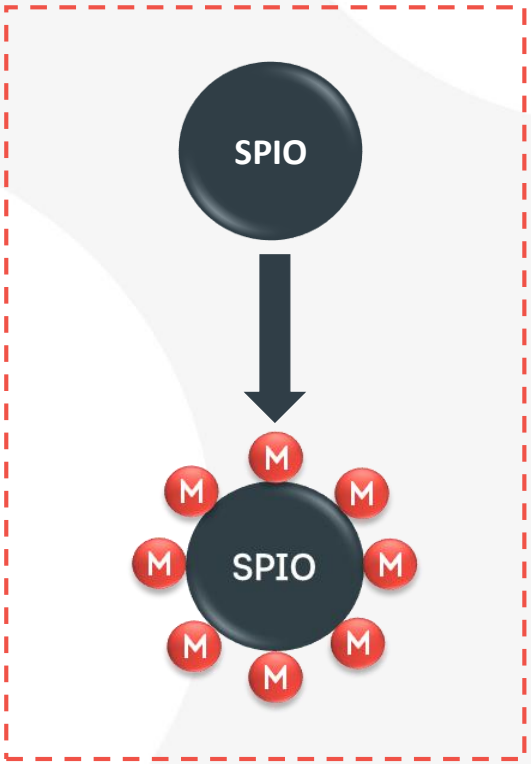
L Ligand

M Metal

Traditional method
(Several steps)

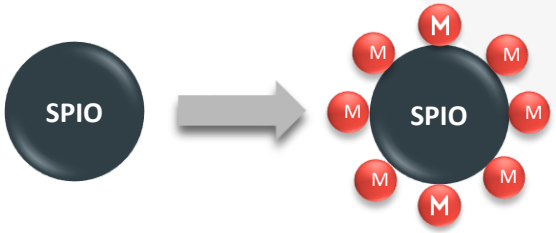


New SON Design
(1 step)



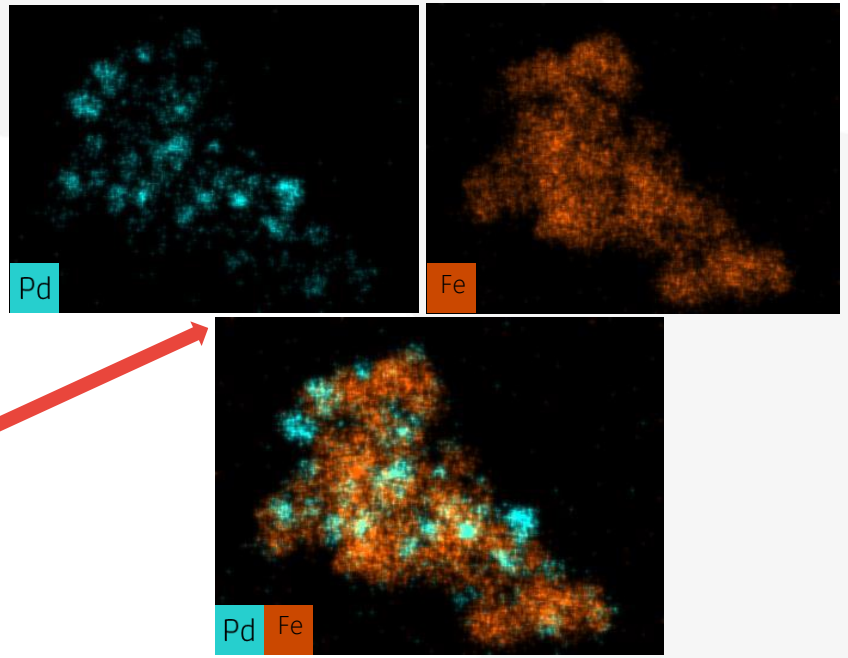
SON
The next generation of smart nanoparticles

Characterization of nano-catalysts



Metal	% wt
Ni	19
Cu	18
Ru	20
Pd	9
Mn	6
Pt	5
Au	5

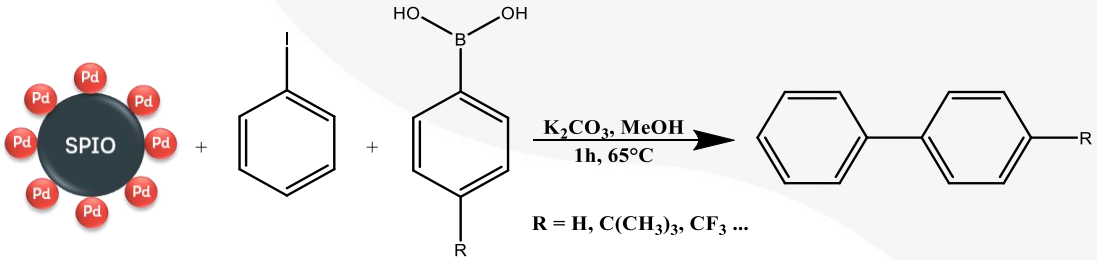
X-ray fluorescence results



Chemical maps – Pd-Kα and Fe-Kα

SON
The next generation of smart nanoparticles

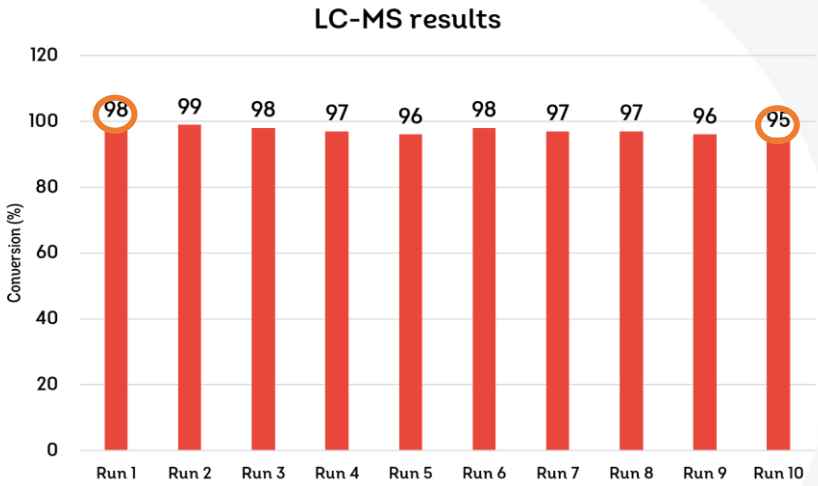
Palladium Coupling - Suzuki



Elements	Fe	Pd
Leaching	< 1 ppm	2-3 ppm

ICP results

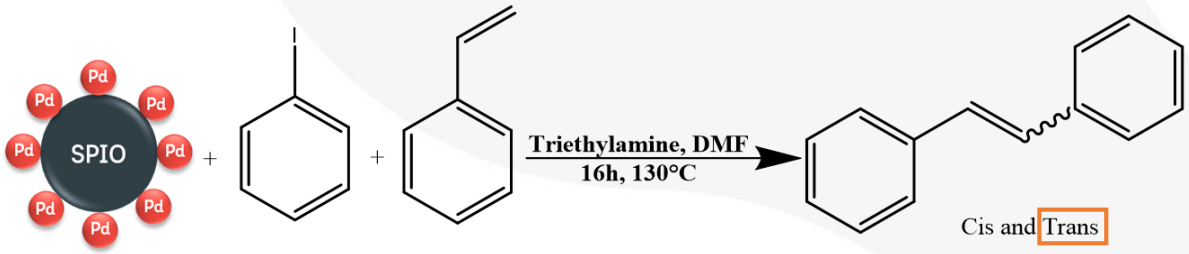
wt%/Substrate	0.1%
Conversion rate	> 95%



10 Runs
→ Still efficient

SON
The next generation of smart nanoparticles

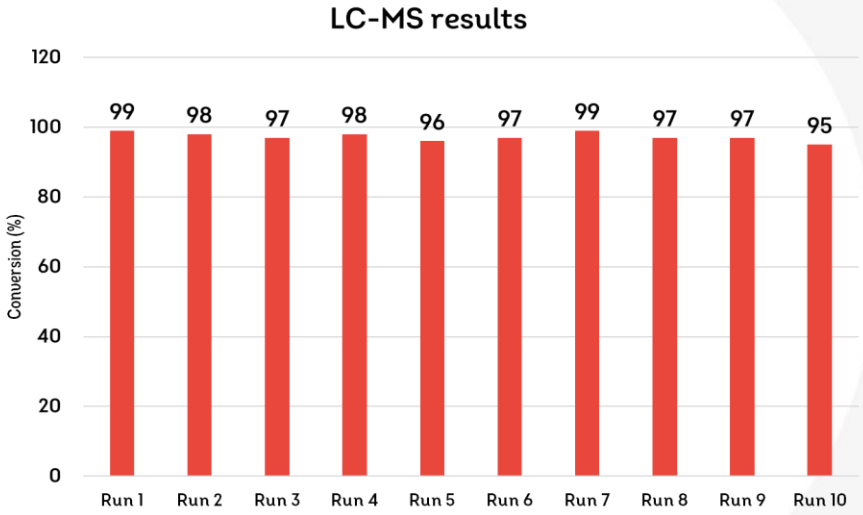
Palladium Coupling - Heck



Elements	Fe	Pd
Leaching	< 1 ppm	2-3 ppm

ICP results

wt%/Substrate	0.1%
Conversion rate	> 95%



10 Runs
→ Still efficient

SON
The next generation of smart nanoparticles

SONSAS

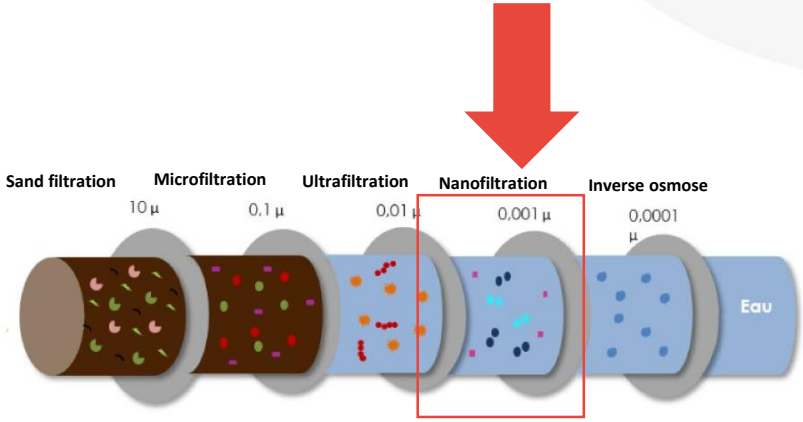
Water treatment solutions

SON

The next generation of smart nanoparticles

Filtration and Water treatment

Soiled water treatment



Nano-Magnets

Iron oxide

Reverse spinel Structure

Magnetic properties

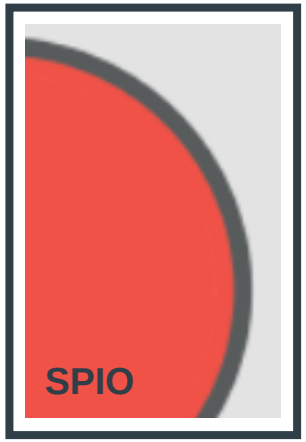
SON

The next generation of smart nanoparticles

Mecanism for Waste treatment

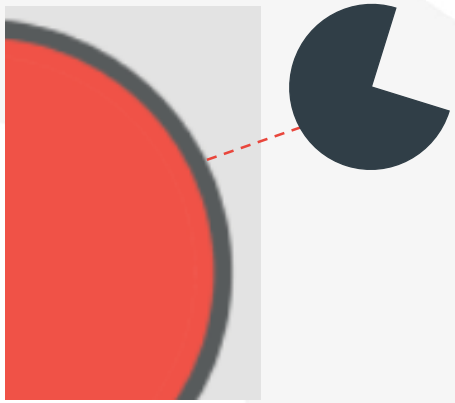
Our know-how: Graff + Functionalization

Nano-magnets



Iron oxyde

- Graff
- Functionalization

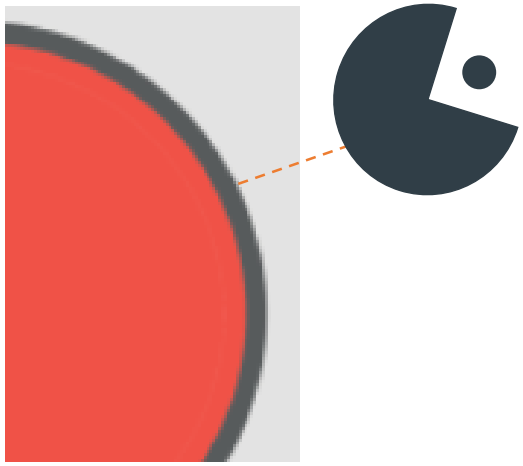


Each molecule has a different affinity with the element to treat

Selective treatment possible

SON
The next generation of smart nanoparticles

Heavy Metals targeted



Metallic Ions

No radioactive

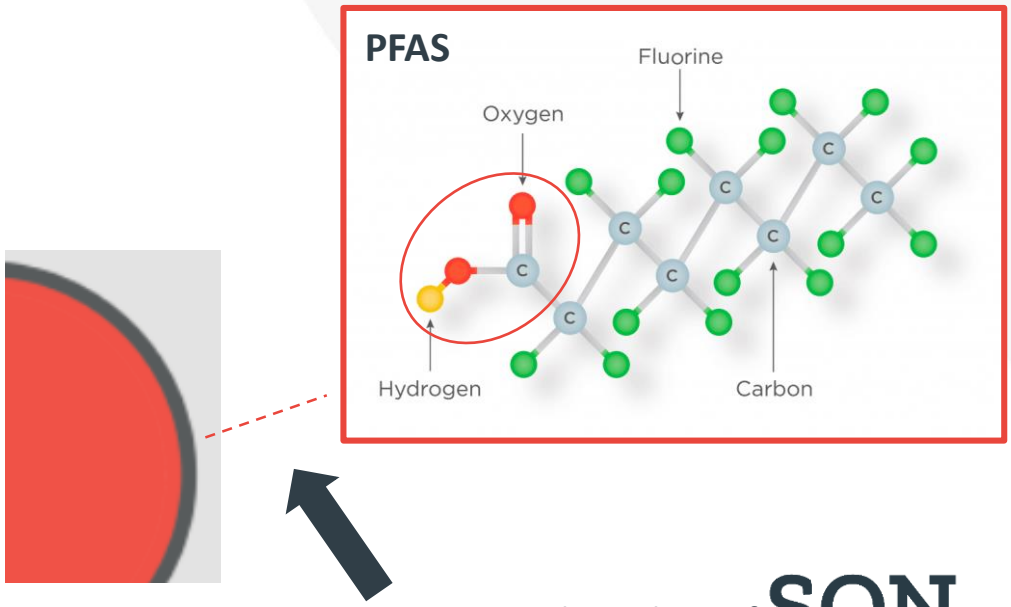
Cuivre
Cadium
Cobalt
Nickel
Plomb
Lithium
Cesium
Arsenic
Zinc
Zirconium
Etc.

Radioactive

Uranium
Plutonium
Cesium

SON
The next generation of smart nanoparticles

Treatment for Forever chemicals (PFAS)

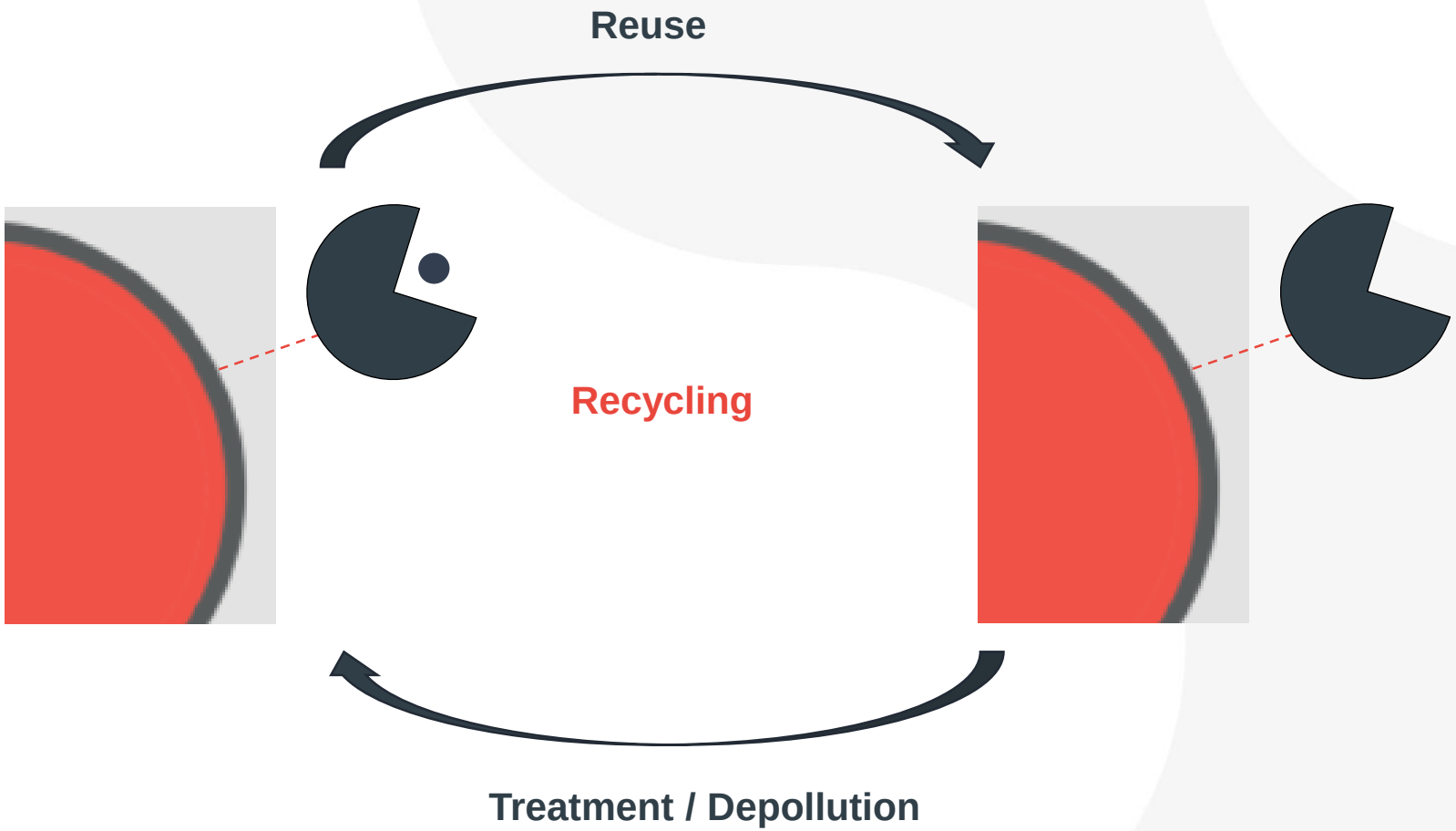


capture = know how of SON

Water Treatment of PFAS is possible

SON
The next generation of smart nanoparticles

objective = Recycling by Reusing



SON
The next generation of smart nanoparticles

SON

The next generation of smart nanoparticles

www.sonsas.com

Siège social:
SON SAS
9, Boulevard Carnot
21000 DIJON

03 80 39 61 16

contact@sonsas.com

SIRET : 891 358 525 00014
TVA : FR54 891 358 525