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# Elaboration of Iron oxide capsules for lab-on-a-chip and microsystems use

Eslam Elkalla 1, Sumera Khizar 1, Nadia Zine 1, Nicole Jaffrezic-Renault 1, Nourredine Lebaz 2, HANGOUET Marie1, Abdelhamid Errachid 1 and Abdelhamid Elaissari 1.

1) Univ Lyon, University Claude Bernard Lyon-1, CNRS, ISA-UMR 5280, 69622 Villeurbanne, FRANCE

2) Univ Lyon, University Claude Bernard Lyon-1, CNRS, LAGEPP-UMR 5007, 69622 Villeurbanne, FRANCE

## INTRODUCTION:

Ferrofluids are recognized as nano materials. Ferrofluid are colloidal suspension comprising of nanoscale magnetic particles within aqueous or organic liquid exhibiting strong magnetic properties. Due to magnetic properties, these ferrofluids can be controlled and manipulated by magnetic field. Microfluidics is a growing field of research that provides a great opportunity to build analytical devices capable of outperforming classical techniques in many biological, chemical, medical and engineering fields. Integrated microfluidics biosensors introduce an innovative platform technology for biosensing and offer advantages such as miniaturization, automation, low cost and high performance in terms of sensitivity and selectivity.

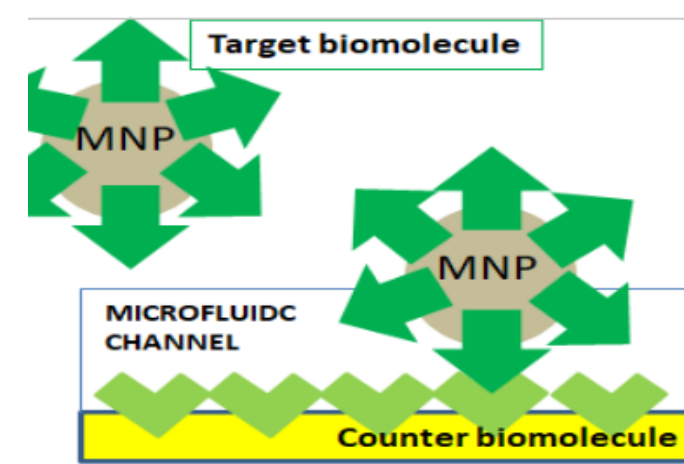
## Applications

1- Lab on-a-chip

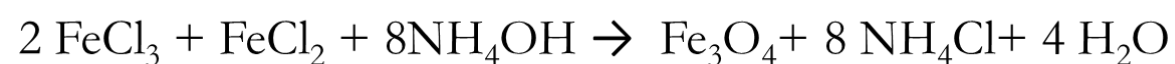
Mixing, Capture, Detection

2- Microfluidic biosensors

Detection, Analysis, Sensing



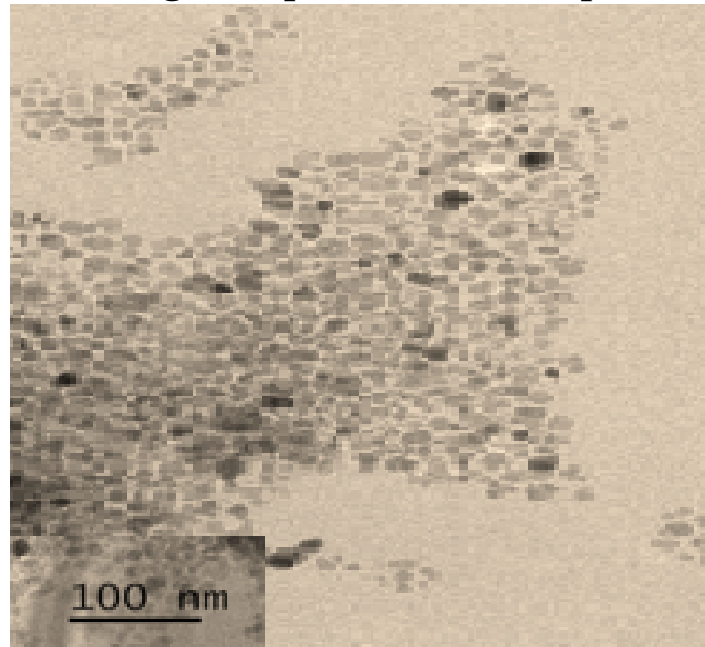
## Aqueous Ferrofluid



Aqueous ferrofluid

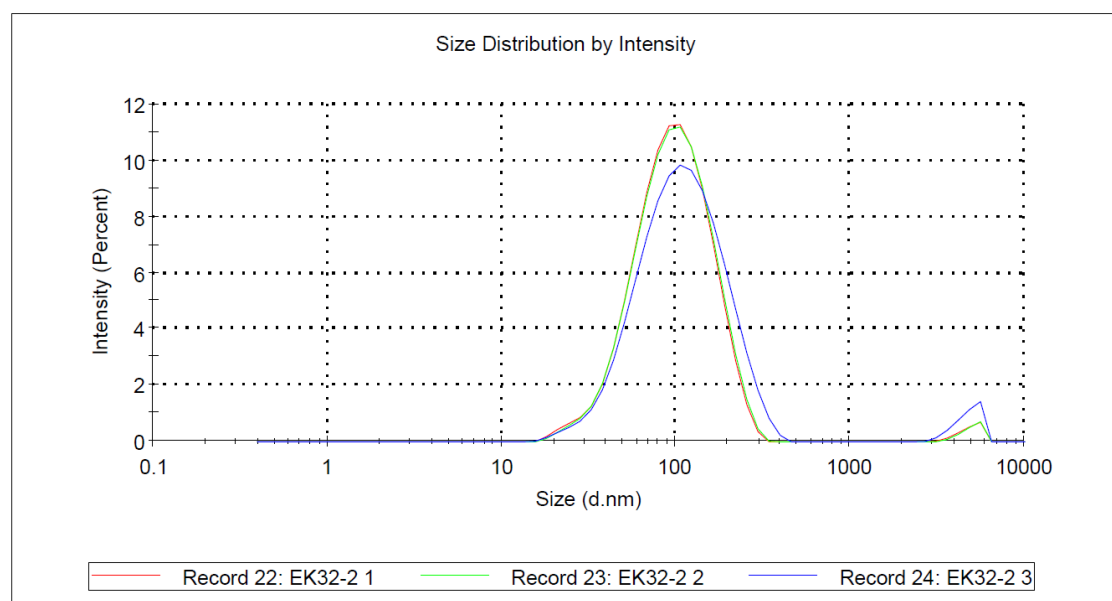


TEM image of aqueous ferrofluid particles

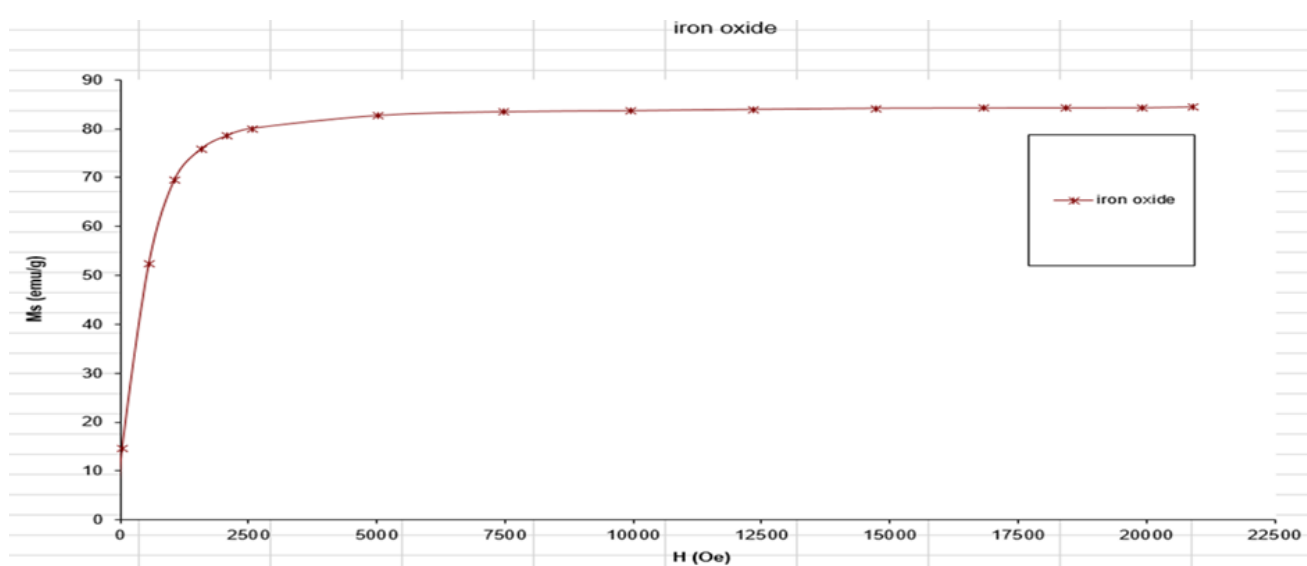


doi.org/10.1134/S0869864315040010

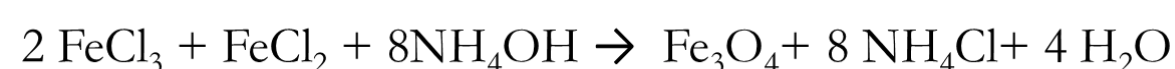
Size distribution of aqueous ferrofluid



Magnetization curve of dried aqueous ferrofluid



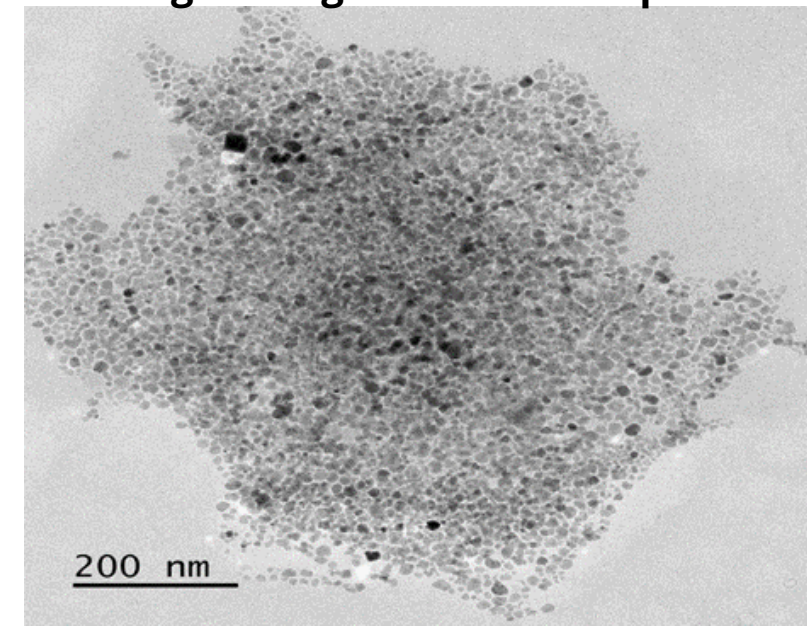
## Organic Ferrofluid



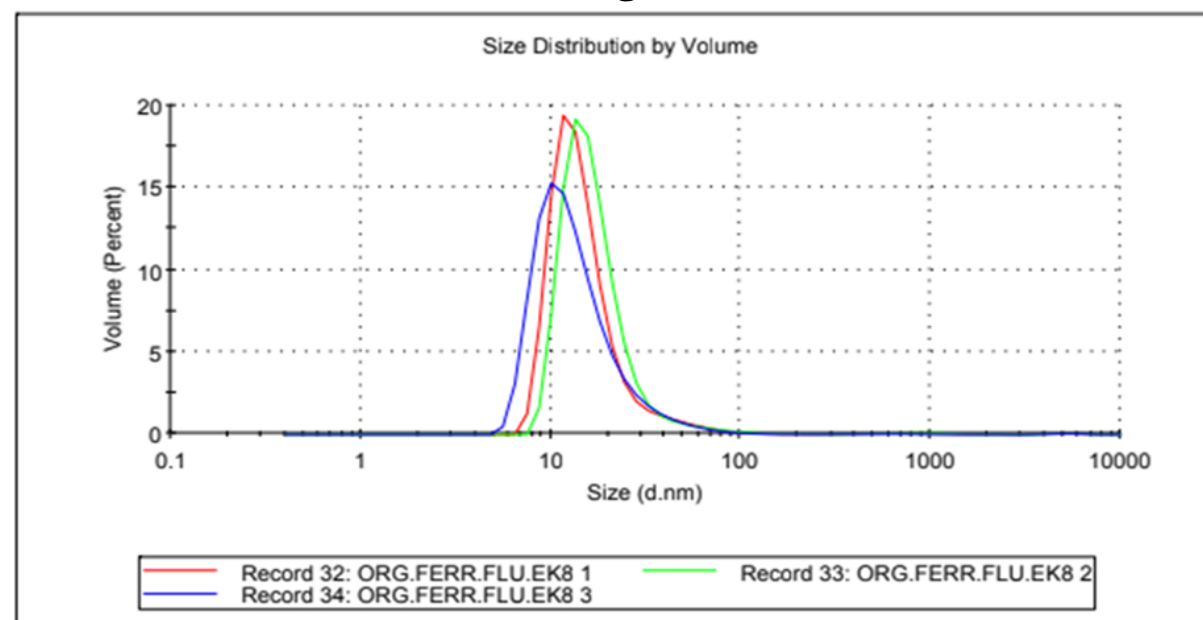
Organic ferrofluid



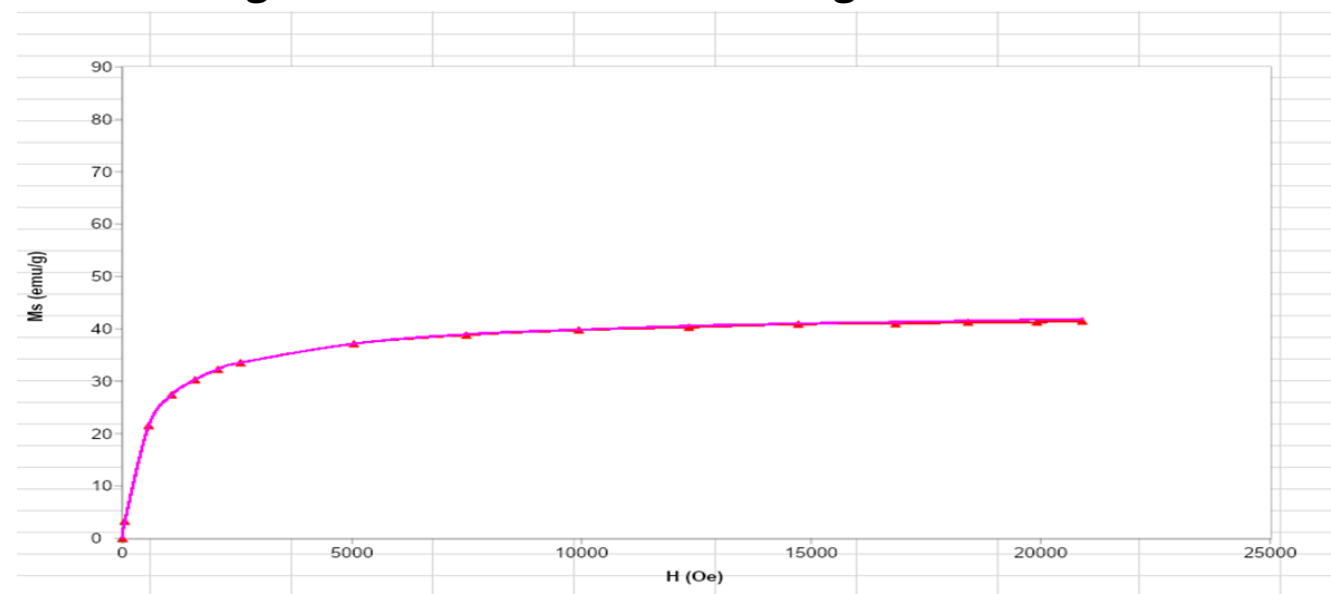
TEM image of organic ferrofluid particles



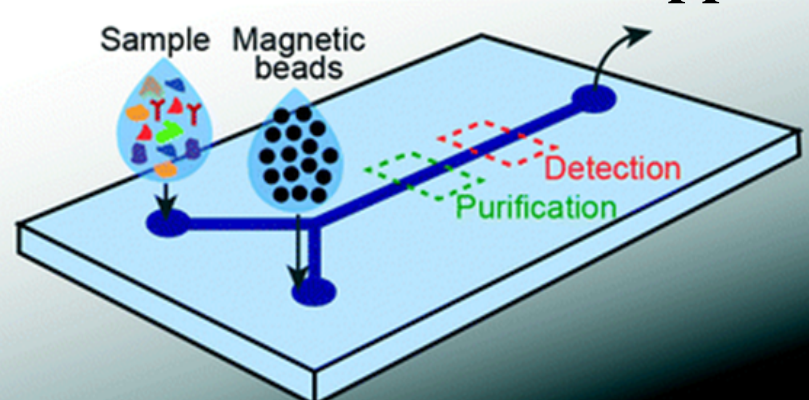
Size distribution of organic ferrofluid



Magnetization curve of dried organic ferrofluid

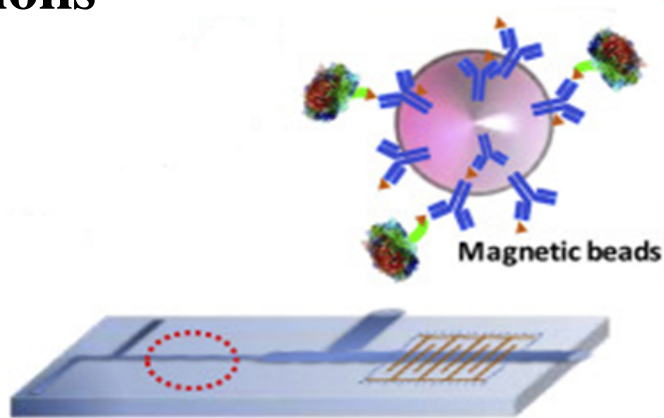


## Applications



Magnetic beads are exploited as immobilization supports and/or label carriers

doi:10.1039/C3LC50477H



Magnetic beads are exploited as immobilization supports and/or label carriers

DOI: 10.1016/j.aca.2015.11.050

## Conclusion:

There are numerous applications of microfluidic using magnetic particles that respond to an external magnetic field in microchannels, which includes bio-chips systems and microfluidic systems. The magnetic particle-based microfluidic system offers an effective and competent method ranging from mixing of fluids to manipulation, detection and isolation of molecules (DNA, proteins, viruses, and cells) from raw samples on a single chip. Magnetic nanoparticles have been extensively utilized in many biomedical applications (MRI, drug delivery, hyperthermia, etc.) because of their exceptional characteristics like high surface-to-volume ratio and ease of surface bio-functionalization. Magnetic particles play a significant role to capture and label target biomolecules effectively inside the system for investigation.