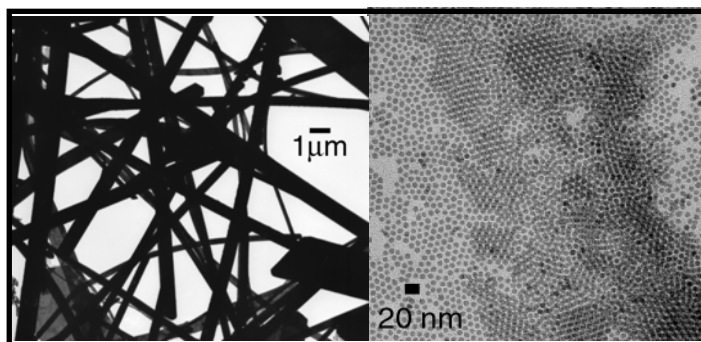


## Shape anisotropy

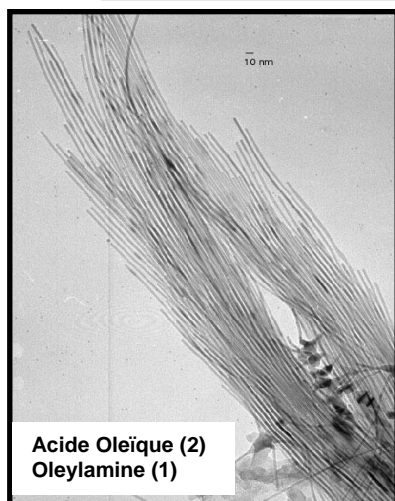
Controlling the growth of nanoparticles (NPs) in homogeneous solutions to obtain a narrow size distribution is already a difficult task. Inducing an anisotropic growth of the NPs in homogeneous media is a challenge. Different mechanisms can be envisaged: easier directed coalescence, formation of seeds followed by an anisotropic growth induced either by an external mechanical (rigid matrix) or energetic (stabilisation of a given crystallographic plane) constraint. In any case, the solvent (Figure 1) and the surfactant (Figure 2) play a crucial role.

We have been able to observe this phenomenon for noble metals (Figure 3), for Fe, Co and Ni, but also for main group elements, intermetallic materials ( $\text{In}_3\text{Sn}$ ) and oxides (Figure 4).



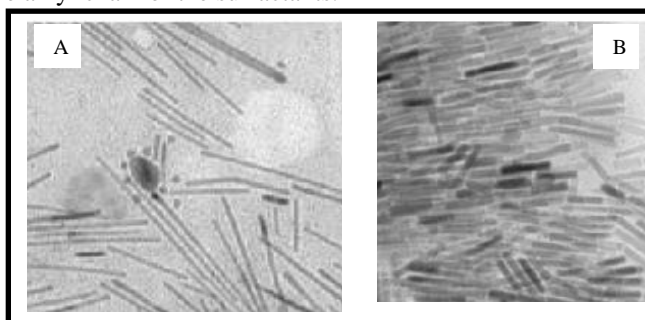
**Figure 1 : Influence of the solvent on NPs growth**

$\text{InCp} + 0.5 \text{ eq. HDA}$ , UV decomposition, without stirring  
 Left in Toluene : micron long wires  
 Right in THF: nanometric spheres



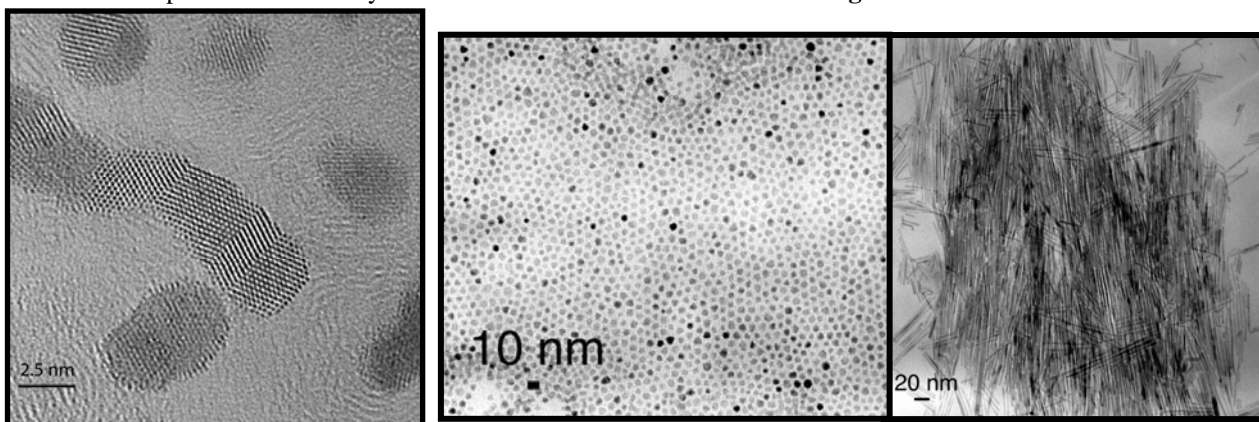
**Figure 2 : Influence of the surfactant on the aspect ratio**

**Left :** Cobalt wires obtained with a 2/1 acide/amine ratio  
**Right :** Cobalt nanorods in oleic acid /amine (1/1) mixtures  
 $\text{C}_n\text{H}_{2n+1}\text{NH}_2$  : A :  $n=16$ , B :  $n=18$ . The aspect ratio directly depends on the length of the alkyl chain of the surfactants.



**Figure 3 :** Pt nanowires obtained through a coalescence process in hexadecylamine/THF medium

**Figure 4 :** Left : isotropic ZnO NPs  
 Right : ZnO nanorods



### Selected publications :

F. Dumestre, et al, *Science*, 2004, **303**, 821. ; F. Dumestre, et al. *Angew. Chem. Int. Ed.* 2002, **41(22)**, 4286 ; K. Soulantica et al. *Angew. Chem. Int. Ed.* 2001, **40 (16)**, 2983; M. L. Kahn, et al. *Adv. Func. Mater.* **2005**, *15*, 458.