

# Use of Ionizing Radiation in the Production of Nanomaterials

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## Abstract

The potential of nanomaterials technology have some very real and useful outcomes: production of materials and products with new properties, contribution to solutions of environmental problems, improvement of existing technologies and development of new applications. Due to the materials very small size (1-100 nm), they have some remarkable, and in some cases, novel properties like significant enhancement of mechanical, structural and magnetic properties. A wide array of nanosystems are produced biologically that can be used for the design of functional materials. There are various known methods to produce nanomaterials. The use of ionizing radiation technology seems very promising for the modification of protein films. On the other hand, stable gelatin nanohydrogel can be prepared by irradiation providing concentration, temperature, physical confinement, dose, and dose rate effects were properly established. Silica-gelatin bio-hybrid and transparent nano-coatings can be prepared through sol-gel technique. Nanostructural characterization of some type of gelatin had already performed showing a high potential for proteins in the field of nanotechnology.

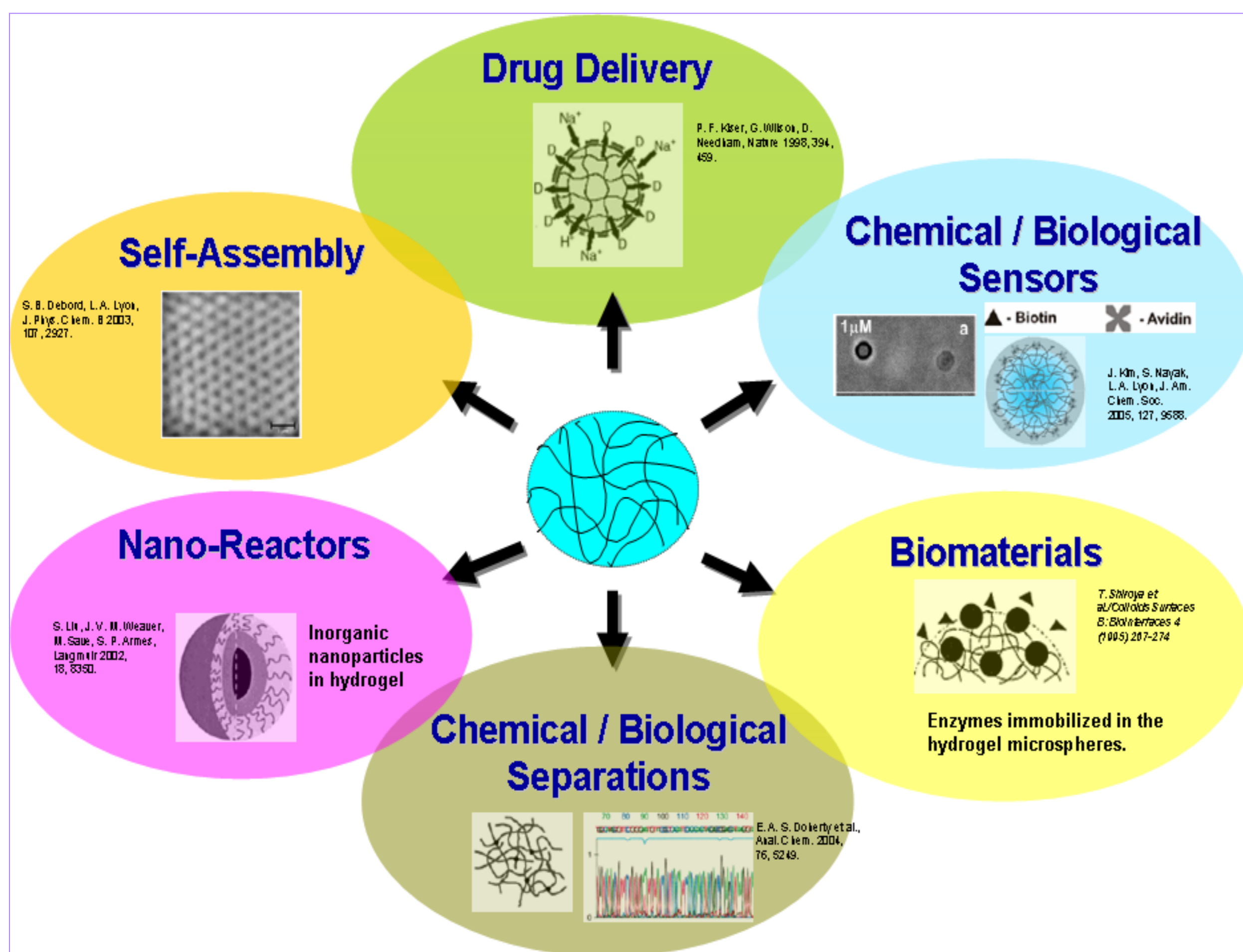


Fig. 1. Hydrogel in Nano-Technologies. (Source: Al-Sheikhly, 2007)

## Nanotechnologies in which Radiation Applications can play key roles:

Nano-electronics  
Diagnostics/Therapeutics  
Packaging  
Biotechnology  
Food systems  
Therapy

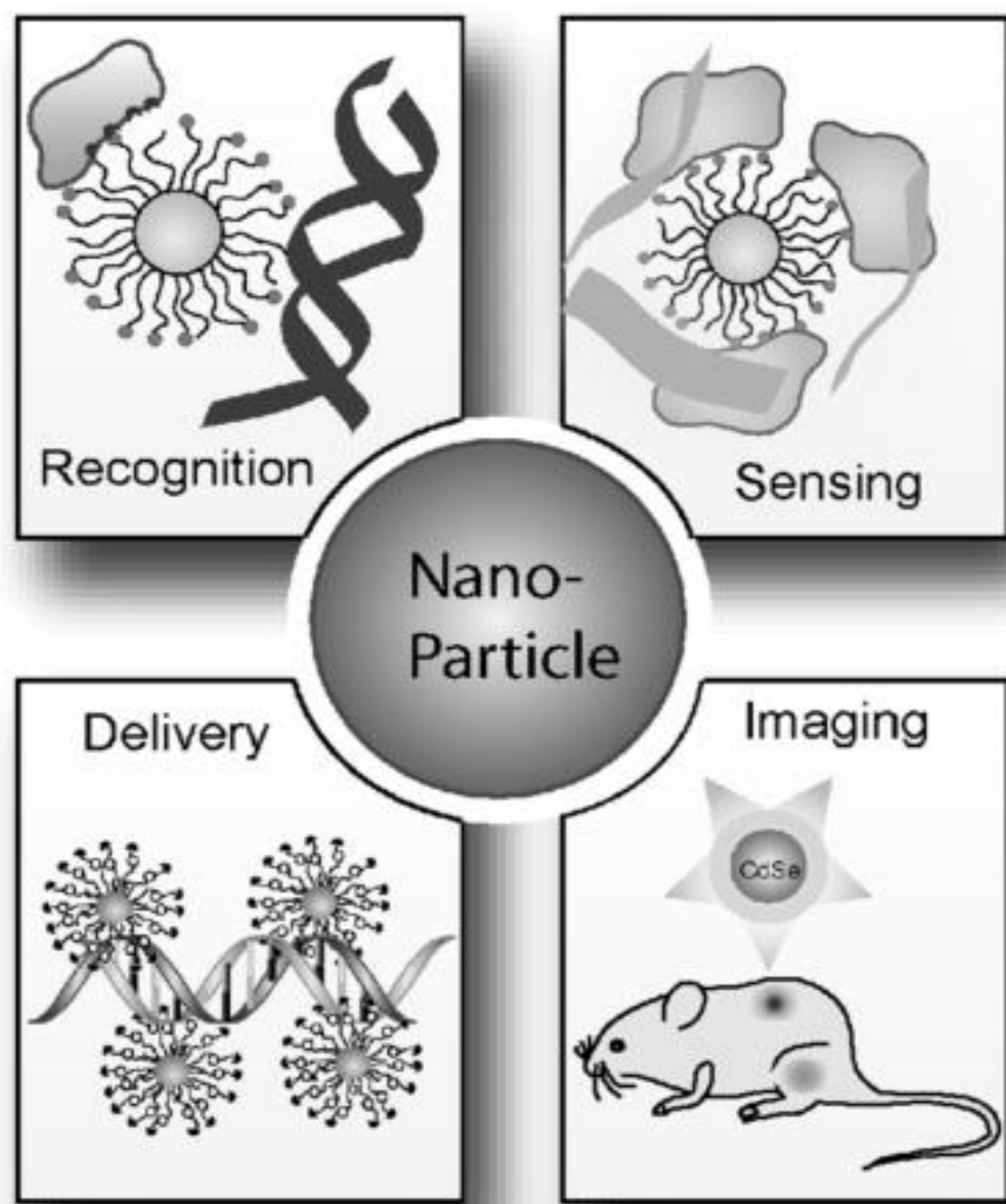


Fig. 2. Nanoparticles in biological sensing, delivery, and imaging of live cells and tissues. (Source: De et al., 2008)

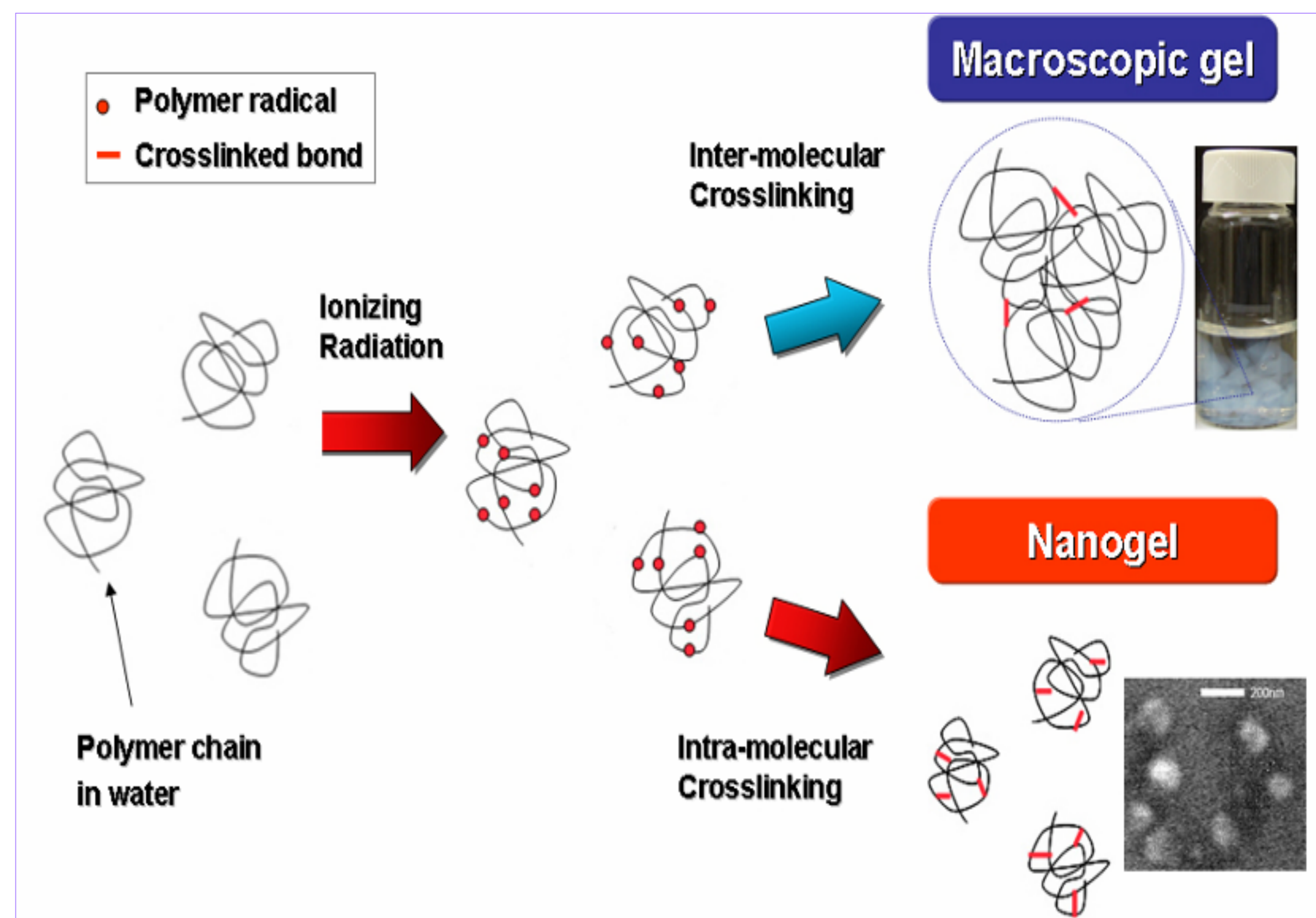


Fig. 3. Inter- vs. Intra-crosslinking. (Source: Al-Sheikhly, 2007)