The combination of the size-dependent properties of nano-
materials with the noninvasive characterisation in mole-
cular imaging is a powerful combination that is being suc-
cessfully applied across disciplines. In the past ten years,
we have witnessed the development of, literally, hundreds
of nanoparticle-based probes for molecular imaging. All
major imaging techniques have been enhanced by the use
of nanoparticles, particularly magnetic resonance imaging
(MRI), positron emission tomography (PET), and optical
imaging. The use of iron oxide nanoparticles for T₁-weighted
and/or T₂-weighted MRI, the design of radioisotope chelator-
free particles for PET, and new developments in fluorescent
nanoparticles (carbon dots and upconverting nanoparticles)
are important milestones in the field. There are two key
features in nanoparticle-based probes which are seldom
found in traditional imaging probes: multimodality and
multifunctionality. The use of, at least, two complementar-
y imaging techniques (multimodality) like PET/MRI or
MRI/Fluorescence and the possibility of incorporating sev-
eral vectors on the surface and/or drugs (multifunctionality)
expand the use of these probes. Furthermore, the properties
of some nanoparticles can be used to create new imaging
techniques, for example, the superparamagnetism of iron
oxide nanoparticles for magnetic particle imaging.

In this issue, we have aimed to provide a platform
for high-quality contributions on nanoparticles application
to molecular imaging. Original papers and review articles
focusing on the latest application of nanoparticle-based
imaging probes were submitted. The topics treated include
the application of iron oxides for MRI, for PET/MRI, and for
drug delivery; new synthesis approaches to obtain magnetic
nanoparticles-based contrast agents; polymeric nanoparticles
for ultrasound imaging; new computed tomography (CT)
contrast agents; and quantum dots for multiplex optical
imaging. We received a total of 16 submissions, and after
two rounds of rigorous review, 9 papers were accepted for
publications in this special issue.

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