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MEDICAL DEVICE

Multifunctional nanoparticles based on metal nanalloys for diagnostic and therapeutic uses

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TRL scale



What's needed for?

The invention relates to nanoparticles (NPs) comprising a metal alloy and a biocompatible organic stabilizer, useful in the diagnosis and therapy of pathological conditions such as cancer. The alloy NPs possess the characteristics required to be employed as contrast agents for some diagnostic techniques based on the acquisition of three-dimensional images of the human body, such as magnetic resonance imaging (MRI) and X-ray computed tomography (CT). The same alloy NPs can be employed also as sensitizers for some radiotherapy techniques such as radiotherapy by X-rays (XRT) or boron neutron capture (BNCT). In some of the embodiments of the invention, all these characteristics can coexist in the same metal NP, allowing imaging guided radiotherapy, where both imaging and/or therapy applications can be achieved simultaneously. Importantly, the composition of the alloy NPs is selected such that they show biocompatibility and spontaneous degradation over time in the body, allowing enhanced NPs clearance compared to single-element (monomodal) nanomedicine agents. The nanoparticles are synthesized by a one-step, low-cost and green process.

Advantages

- Localization of radiotherapy sensitizers by bimodal imaging
- Compatible with MRI and CT
- Compatible with x-ray radiotherapy, boron neutron capture or both
- Biodegradability
- Low-cost and green synthesis, no chemicals

Applications

- Imaging-guided radiotherapy
- Sensitizers for radiotherapy
- Bimodal imaging (MRI/CT)