e recent development of multifunctional nanoparticles comes e word "nanoparticles" refers to nanostructures particulated, with variable shape, but with at least one dimension in the "nanothrom the growing needs in biomedical applications and the evolution scale, that is lower than 100 nanometers (nm). Shapes can be spheriodatanotechnology. ese nanoparticles have the potential to integrate lamentous, tubular, and irregular. ey can be formed by a variety of various functionalities. For instance they can provide contrast for materials. Nanoparticles can be dispersed, fused, agglomerated, and rent imaging modalities, support optimized delivery of drug and aggregated. e common characteristics of nanoparticles concernallow thermal therapies. ese functionalities are obtained through the diversity among proprieties related to dimensions and proprieties dvanced polymer processing, nanocrystalline synthesis, coating and related to the parental chemical species. Indeed, referring to a massented strategies.

value, nanoparticles have an exposed surface much higher than the In particular, the adoption of materials in nanoscale allows same mass in shape of macro-particle. at characteristics increases modifying basic properties such as solubility, di usivity, blood signi cantly their chemical and biological activity. circulation, drug release and immunogenicity [1]. In the last 20 years,

Nanoparticles can have natural origin (coming from naturalnanoparticle-based agents have been developed for treating a variety combustions such volcanos and spontaneous res) or they can have diseases: in particular, cancer, diabetes, asthma, allergy, infections anthropogenic origin (coming from vehicular tra c, mainly diesel ese nanoscale agents are developed for mitigating therapeutic toxicity, decreasing health-care costs and so on. Moreover, concerning related, from industrial plants, from domestic heating). diagnostic applications, nanoparticles help identify disease markers

Moreover nanoparticles can be arti cially produced (from undetectable with traditional diagnostics. Agents for imaging contrast engineered processes) that is specically produced fromased on nanoparticles have also demonstrated to improve the nanotechnologies at industrial level in order to perform technological performances of magnetic resonance imaging. Particular expectations aims in various scienti c and industrial elds. For that reason the are also based on the sector of bionanoparticles. term "nanotechnologies" refers to the development and production of Unfortunately, a part of the nanomaterials typical of a successful materials and systems in the order of nanometers.

nanotechnology ultimately nd their way into the environment. A lack Since long time, people have been exposed to natural and knowledge concerns the behavior of nanoparticles in the environment anthropogenic nanoparticles. On the contrary, arti cial nanoparticles and their interaction with the biological systems. Nanoparticles can are new agents, to whom people begin to be exposed only now (appendentate an organism through a variety of routes, e.g. the dermal, oral possibly will be more and more exposed). Even if nanotechnologies and respiratory tracts. Nanoparticles are able to cross the blood-brain considered an important opportunity in the scienti c and technologicbarrier a ecting the central nervous system. ese ultra ne particles development, they are seen also as a new potential risk for the human be responsible of serious pulmonary and cardiac diseases. development, they are seen also as a new potential new pot

of nanoparticles, inducing in the restaurant rooms a signi cant number

e growing interest on nanoparticles in the scientic circles of particles per critic compared with other case studies [2,3]. Another is demonstrated from the dynamics of articles in the international ecent research demonstrated that particle size distribution measured database Scopus®. is is a wide abstract and citation database (60e-cigarette-generated mainstream aerosol showed a mode slightly million records) of peer-reviewed literature. Scopus delivers the month than 100 nm and similar to conventional tobacco cigarette comprehensive overview of the world's research output in the elds of ne [4]. No e ects of the nicotine content as well as liquid avor were science, technology, medicine, social sciences and arts and humanities nd in particle size distribution data. e nanoparticle concerned In Figure 1 the dynamics of Scopus® indexed papers on nanoparticles is

reported. In the last 10 years the amount of articles increased 7 times,

reaching the considerable value of 34,919 per year (in 2013).

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that the opportunities related to the nanoparticle sector, speci cally as lonescu G, Zardi D, Tirler W, Rada EC, Ragazzi M (2012) A critical analysis a result of the synergy between bioengineering and biomedicine, will be of emissions and atmospheric dispersion of pollutants from plants for the treatment of residual municipal solid waste, UPB Sci Bull 74: 227-240.

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