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SUPERPARAMAGNETIC RELAXATION IN ENSEMBLES OF ULTRASMALL NANOPARTICLES FERRIHYDRITE

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Abstract. Molecular docking is a computational technique that predicts the binding affinity of ligands to receptor proteins. Although it has potential uses in nutraceutical research, it has developed into a formidable tool for drug development. Bioactive substances called nutraceuticals are present in food sources and can be used in the management of diseases. Finding their molecular targets can help in the creation of disease-specific new therapies. The purpose of this review was to explore molecular docking's application to the study of dietary supplements and disease management. First, an overview of the fundamentals of molecular docking and the various software tools available for docking was presented. We further highlighted biochemistry pathways and models from recent studies that have revealed molecular mechanisms to pinpoint new nutraceuticals' effects on disease pathogenesis. It is convincingly true that molecular docking is a useful tool for identifying the molecular targets of nutraceuticals in the management of diseases. It may offer information about how nutraceuticals work and support the creation of new therapeutics. Therefore, molecular docking has a bright future in nutraceutical research and has a lot of potentials to lead to the creation of brand-new medicines for the treatment of disease.

Keywords: superparamagnetism, relaxation, ferrihydrite

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INTRODUCTION

Recently, researchers have been paying increasing attention to the possible practical applications of na-noscale materials. Undoubtedly, the field of biomedical applications is the most relevant among the prac-tical applications of nanomaterials. It is usually assumed that an external magnetic field is used to implement thermal effects on the affected tissues, in which magnetic nanoparticles are pre-localized. This process is called magnetic hyperthermia.

The heating of magnetic nanoparticles in an external alter-nating magnetic field is mainly due to hysteresis losses associated with the relaxation processes of the magnetic moments of the particles. Here, the term "relaxation processes" refers to the characteristic re-versal time of the magnetic moment of the particle. The parameter that determines the effectiveness of magnetic heating in hyperthermia is the amount of effective energy absorption (SAR) for heating by a magnetic field.