

Abstract Submitted
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Structural disorder and anomalous water diffusion in random packing of spheres ANDREA GABRIELLI, Istituto dei Sistemi Complessi (ISC) - CNR, Italy, SILVIA CAPUANI, IPCF - CNR, Italy, MARCO PALOMBO, VITO D.P. SERVEDIO, GIANCARLO RUOCCO, Dipartimento di Fisica, Università “Sapienza,” Rome, Italy — Nowadays Nuclear Magnetic Resonance diffusion (dNMR) measurements of water molecules in heterogeneous systems have broad applications in material science, biophysics and medicine. Up to now, microstructural rearrangement in media has been experimentally investigated by studying the diffusion coefficient ($D(t)$) behavior in the tortuosity limit. However, this method is not able to describe structural disorder and transitions in complex systems. In this talk we show that, according to the continuous time random walk framework, the dNMR measurable parameter α , quantifying the anomalous regime of $D(t)$, provides a quantitative characterization of structural disorder and structural transition in heterogeneous systems. This is demonstrated by comparing α measurements obtained in random packed monodisperse micro-spheres with Molecular Dynamics simulations of disordered porous media and 3D Monte Carlo simulation of particles diffusion in these kind of systems. Experimental results agree well with simulations that correlate the most used parameters and functions characterizing the disorder in porous media [1].

[1] M. Palombo, A. Gabrielli, V.D.P. Servedio, G. Ruocco, S. Capuani, Scientific Reports **3**, 2631 (2013), doi:10.1038/srep02631

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