Obstructed diffusion in fractal globules

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Elucidating the structure of *in vivo* chromosome DNA inside a nucleus is a long-standing problem over several decades engaging broad interests in the fields of molecular & physical biology and statistical physics. Experimental evidences have found that the interphase chromosome DNA is not a spaghetti-like random polymer but a compact, nonentangled polymer having certain order such as territory. The fractal globule, a nonequilibrium condensed state of polymer having hierarchical folding without entanglement, has been recently suggested a minimal model for the human chromosome DNA in a nucleus. In this work, we investigate the diffusion of particles in a fractal globule, providing a new insight into the molecular diffusion in a nucleoplasm. With the fractal globules generated on lattice, we perform the Langevin dynamics simulations of tracer particles exploring in the fractal globule in the presence of steric effect. The statistical properties of the particle diffusion are analyzed in detail in comparison with the corresponding obstructed diffusions in an equilibrium polymer and in a random percolation.