Anisotropic Anomalous diffusion in a dye-doped liquid-crystalline cell

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The diffusive process of neutral particles (dyes) in a semi-infinite cell limited by an adsorbing surface is theoretically investigated. The densities of bulk and surface particles are analytically determined, taking into account the conservation of the number of the neutral particles in the sample. It is shown that an anomalous diffusion process can take place according to the time scale considered. For short time interval there is a sub-diffusion process, followed by a super-diffusive regime. For large time interval the diffusive process tends to a normal behavior. The analysis is suitable for the description of the adsorption phenomena of neutral particles (dyes) as well as charged particles (ions) in anisotropic media like nematic liquid crystals.