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Structural Studies Of Water And Simulated Body Fluid (Sbf) Confined In A Sol-Gel Network.

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Abstract:

The behavior of water confined in a mesoscopic pore network differs significantly from that of the bulk liquid. The structure and dynamics of the water molecules are affected by both the nature of the geometrical confinement and the interaction forces at the pore walls. The effect of confinement was investigated, using X-rays and neutron diffraction, in different disordered pores such Vycor glass, Activated Carbon, Silica gel and recently in a regular network porous (MCM-41). We show that the water molecules structure present a reorganization due to the distortion or and brokenness of the hydrogen bonding. However, there is no general theory predicting the modified behavior of the confined liquid, which is dependent on a number of parameters, such as pore size, filling factor, and most importantly, the nature of the surface–water interaction.

Actually, we study the possibility to produce homogeneous biomaterials with structures preserved presenting ordered networks in order to perform a routing of drugs into. For applications as biomaterial in orthopedic or maxillo-facial surgery, a new glass formulation was synthesized using the sol-gel process and soaked in simulated body fluid (SBF) to evaluate glass bioactivity. Ionic exchanges at the interface glass-SBF were evaluated by studying evolutions of calcium, phosphorus and silicon concentrations in SBF using ICP-OES. Changes in glass surface, and the formation of crystalline phases were analyzed using XRD, SEM, EDS and FTIR methods.