

HYDRATED IONS AS NANO-BALL-BEARINGS

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The combination of tenacious attachment of hydration layers to ions in aqueous salt solutions, together with the possible lability of these layers (covering some 14 orders of magnitude in exchange/relaxation rates) leads to interesting nanomechanical properties, including the long-known hydration repulsion. In recent years the central role of such hydrated ions in lubrication phenomena in both synthetic and especially biological systems has been pointed out¹⁻³. The talk will focus on recent developments, including the effect on confined water and hydrated ions of large electric fields.

1. Raviv, U. and Klein, J., 'Fluidity of bound hydration layers' – **Science** **297**, 1540-1543 (2002)
2. Raviv, U., Giasson, S., Kampf, N., Gohy, J-F., Jerome, R. and Klein, J., 'Lubrication by charged polymers', **Nature**, **425**, 163-165 (2003)
3. Briscoe, W.H., Titmuss, S., Tiberg, F., McGillivray, D.J., Thomas, R.K., Klein, J., 'Boundary lubrication under water', **Nature** **444**, 191-194 (2006)
4. Klein, J. 'Molecular mechanisms of synovial joint lubrication', **Proc. IMechE Vol. 220 Part J: J. Engineering Tribology**, **220**, 691-710 (2006).