Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Effect of Ion Structure on Nanoscale Friction in Protic Ionic Liquids

James Sweeney[1], Grant B. Webber[1], Mark W. Rutland[2,3], Rob Atkin[1,*]

[1]Centre for Advanced Particle Processing and Transport, Newcastle Institute for Energy and Resources, The University of Newcastle, Callaghan, NSW 2308, Australia

[2]Surface and Corrosion Science, Department of Chemistry, Royal Institute of Technology, SE-100 44 Stockholm, Sweden

[3]SP Technical Research Institute of Sweden, Stockholm, Sweden

* To whom correspondence should be addressed.

Email: rob.atkin@newcastle.edu.au

Supporting Information

Figures

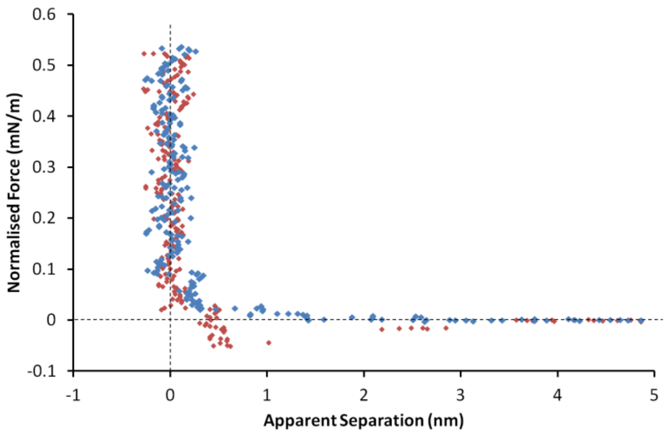

Figure A. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in EAN. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

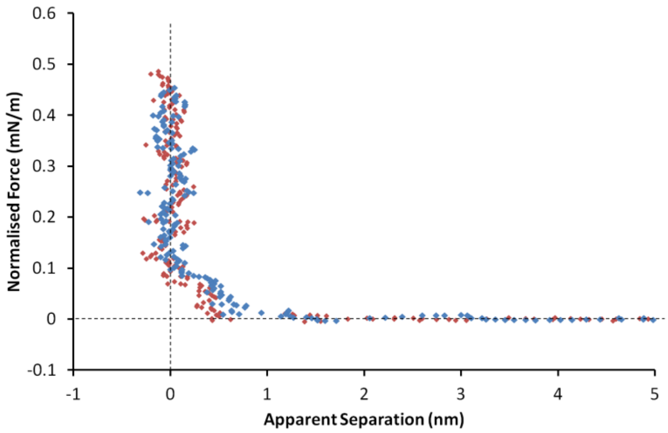

Figure B. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in PAN. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

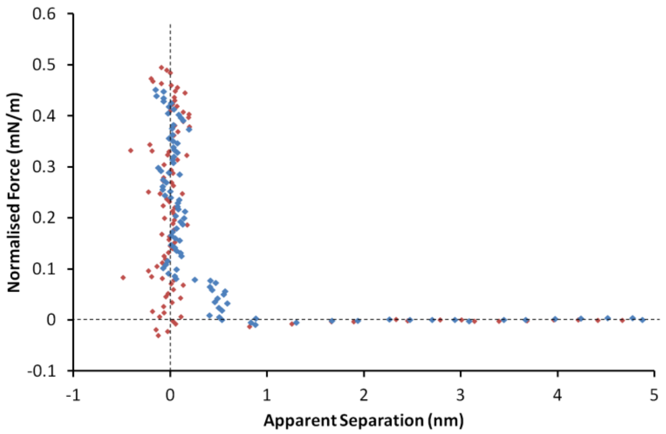

Figure C. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in EAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

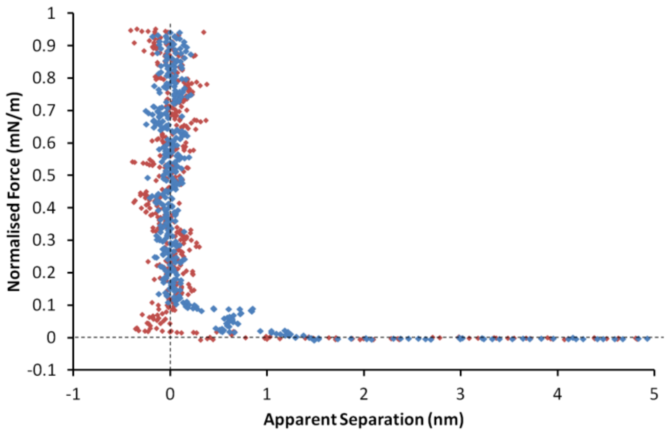

Figure D. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in PAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

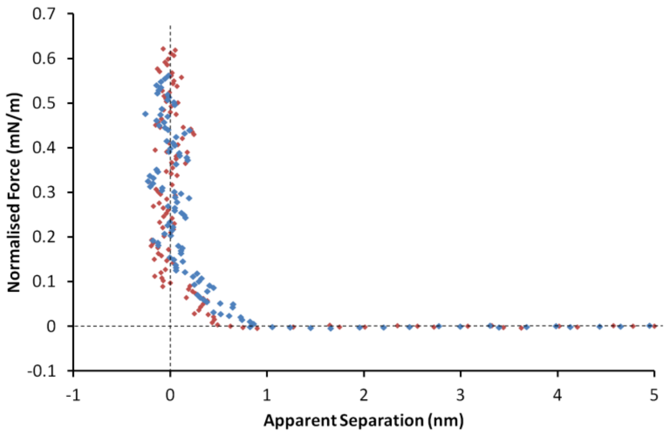

Figure E. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in DMEAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

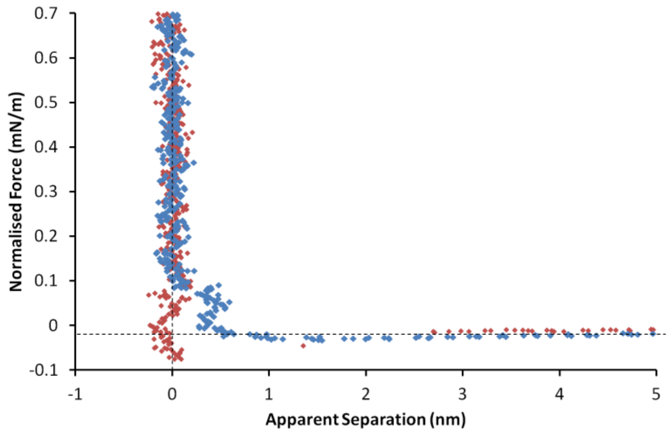

Figure F. Force as a function of apparent separation for a ≈ 5 μm diameter silica colloid probe approaching (blue diamonds) and retracting from (red diamonds) a mica surface in EtAN. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

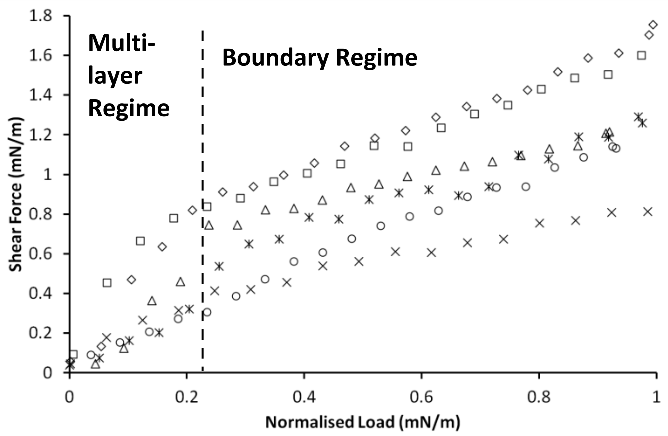

Figure G. Shear force as a function of normal load at a sliding velocity of 30 μm·s^{-1} for each IL in this study. The shear force presented is the average of at least three normalised datasets taken with the same cantilever/colloidal probe combination. Squares: PAF, diamonds: PAN, triangles: EtAN, stars: EAN, circles: EAF, crosses: DMEAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

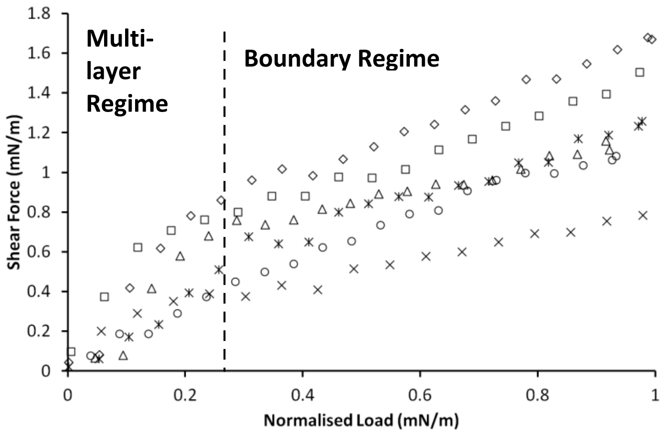

Figure H. Shear force as a function of normal load at a sliding velocity of 20 μm·s^{-1} for each IL in this study. The shear force presented is the average of at least three normalised datasets taken with the same cantilever/colloidal probe combination. Squares: PAF, diamonds: PAN, triangles: EtAN, stars: EAN, circles: EAF, crosses: DMEAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

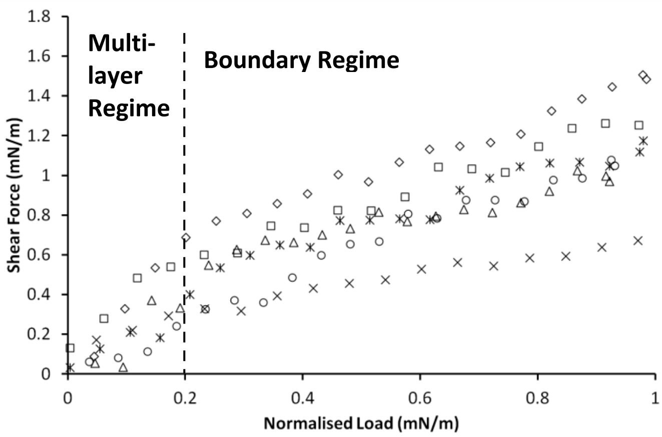

Figure I. Shear force as a function of normal load at a sliding velocity of 10 μm·s^{-1} for each IL in this study. The shear force presented is the average of at least three normalised datasets taken with the same cantilever/colloidal probe combination. Squares: PAF, diamonds: PAN, triangles: EtAN, stars: EAN, circles: EAF, crosses: DMEAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

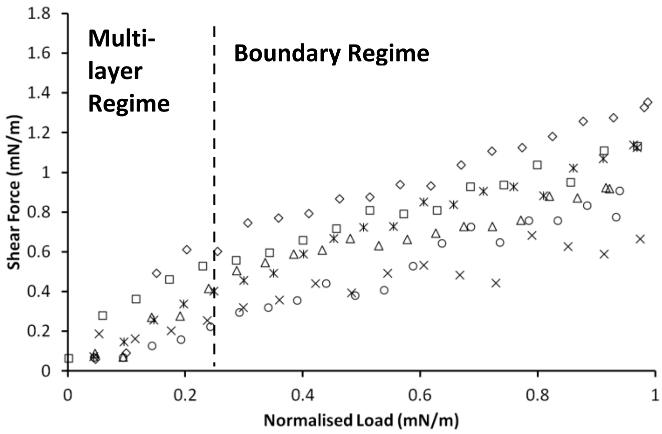

Figure J. Shear force as a function of normal load at a sliding velocity of 5 μm·s^{-1} for each IL in this study. The shear force presented is the average of at least three normalised datasets taken with the same cantilever/colloidal probe combination. Squares: PAF, diamonds: PAN, triangles: EtAN, stars: EAN, circles: EAF, crosses: DMEAF. Forces are normalised by $2\pi R$, where R is the radius of the colloid probe.

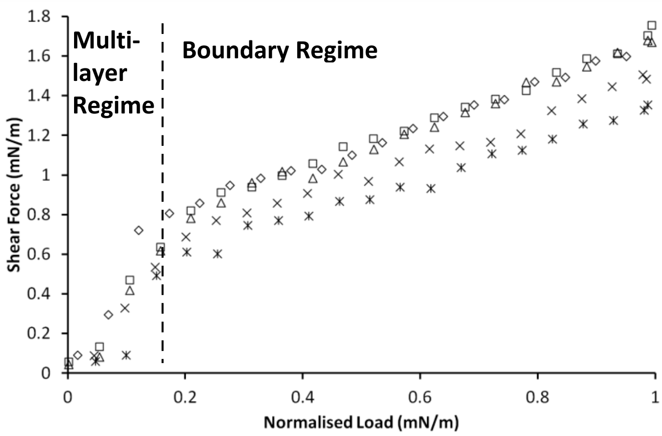

Figure K. Shear force as a function of normal load at various sliding velocities for a silica colloid probe sliding against a mica surface in PAN. Diamonds: 40 μm·s^{-1}, squares: 30 μm·s^{-1}, triangles: 20 μm·s^{-1}, crosses: 10.0 μm·s^{-1}, stars: 5 μm·s^{-1}. The dashed vertical line delineates the multilayer regime from the boundary regime.