Supplementary Information

(I) Calculation of Herztian contact parameters:

The contact radius is given by:

$a = \sqrt[3]{3WR/4E'}$

where W is the load, R is the PTFE ball radius and E' is defined by the following equation:

$$\frac{2}{E'} = \frac{1 - {v_1}^2}{E_1} + \frac{1 - {v_2}^2}{E_2}$$

The indentation depth is given by:

$$\delta = \frac{a^2}{R}$$

(a) For the PTFE ball-PDMS disc contact used in this tribological study, the values of the variables are as follows:

$W = 2\ N$
$R = 9.25\ mm$ $E_1 = 0.5\ GPa$ (PTFE)
$E_2 = 2.4\ MPa$ (PDMS)
$v_1 = 0.5$ (PTFE)
$v_2 = 0.46$ (PDMS)

This yields a contact radius of 1.30 mm and an indentation depth of 182 μm.

(b) For the PDMS ball-PDMS disc contact used in this tribological study, the values of the variables are as follows:

$W = 2\ N$
$R = 9.25\ mm$ $E_1 = 2.4\ MPa$ (PDMS)
$E_2 = 2.4\ MPa$ (PDMS)
$v_1 = 0.46$ (PDMS)
$v_2 = 0.46$ (PDMS)

This yields a contact radius of 1.90 mm and an indentation depth of 389 μm.

Supplementary Figures

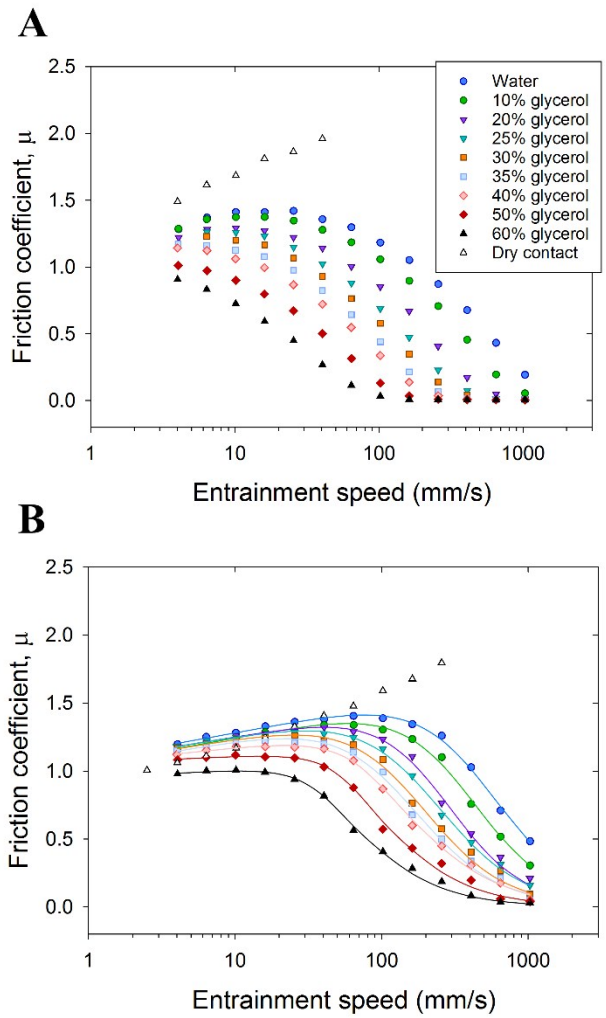

Figure S1. The friction coefficient as a function of entrainment velocity for the series of glycerol-water mixtures, as well as the dry contact, for a PDMS ball in tribological contact with (A) a smooth and (B) a rough PDMS disc.

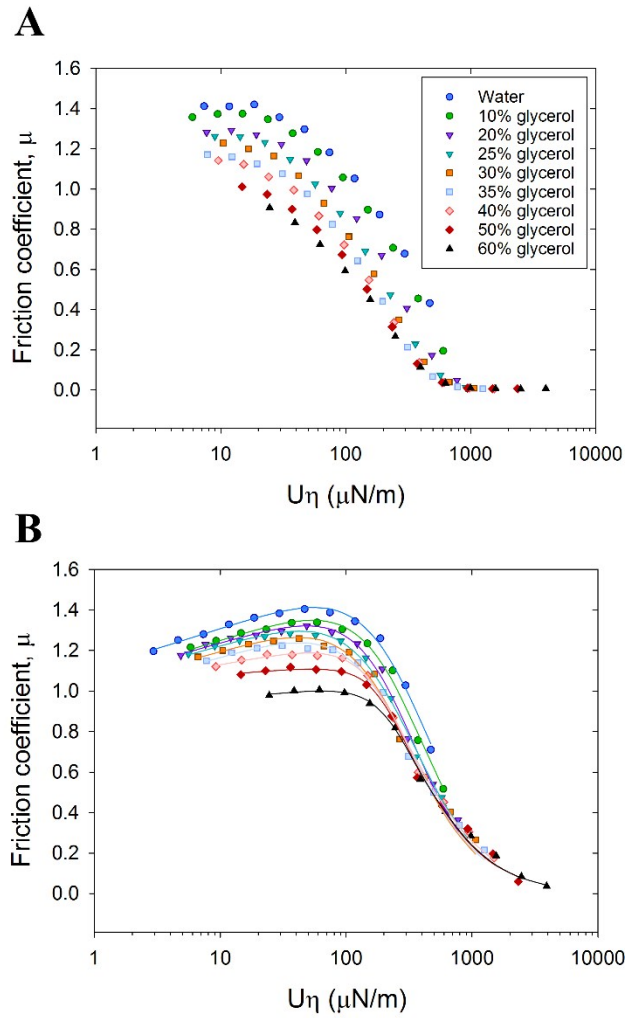

Figure S2. The same friction data as in Figure S1, for the series of glycerol-water mixtures, plotted as a function of reduced velocity Uη for (A) a smooth and (B) a rough PDMS-PDMS contact.

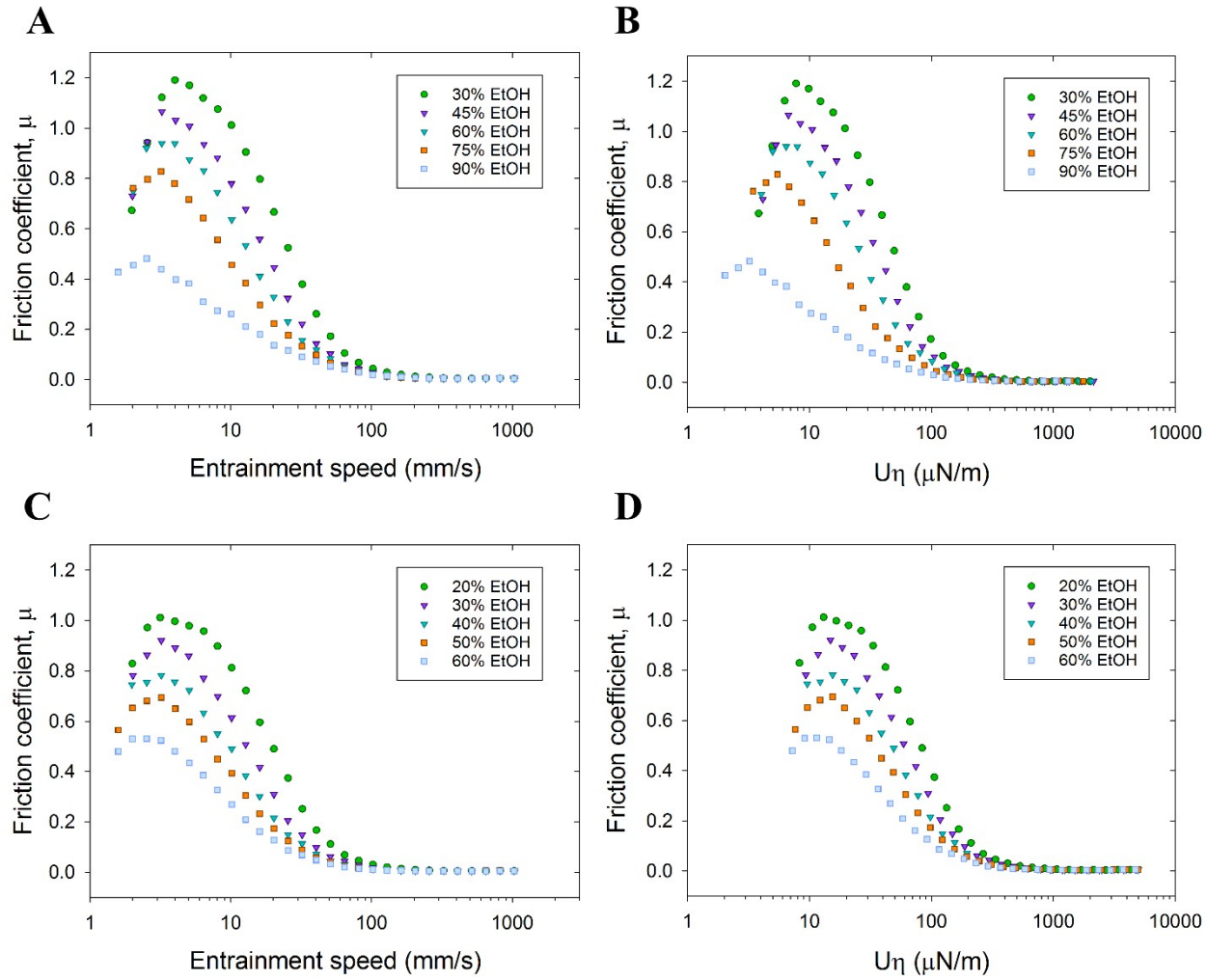

Figure S3. Friction profiles measured for the two glycerol-ethanol-water lubricant series in a smooth PDMS-PDMS contact. Data for the low viscosity lubricants (~1.8 mPas) are shown as a function of (A) entrainment speed and (B) reduced velocity, and the corresponding data for the high viscosity lubricants (~4.6 mPas) in (C) and (D).

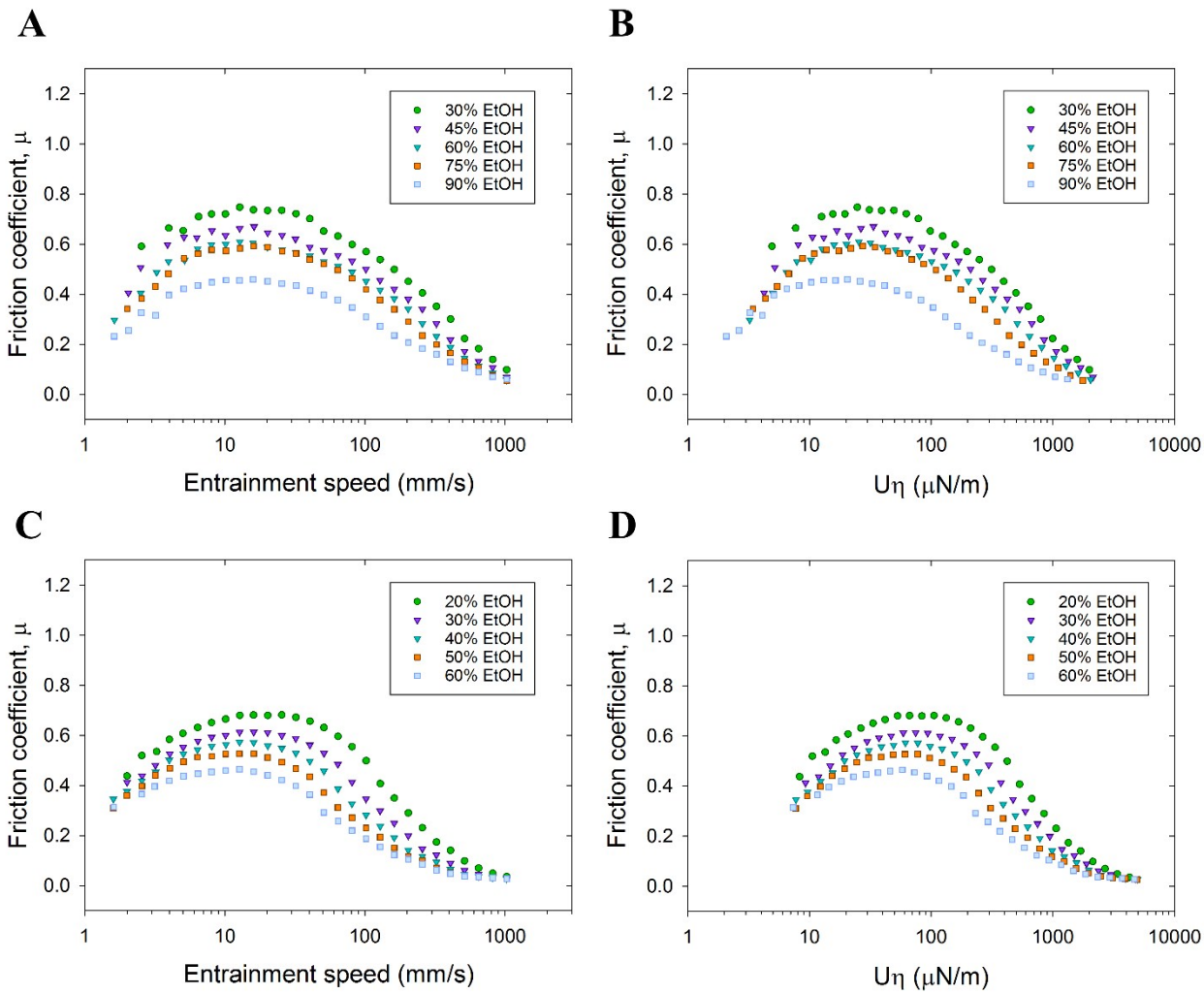

Figure S4. Friction profiles measured for the two glycerol-ethanol-water lubricant series in a rough PDMS-PDMS contact. Data for the low viscosity lubricants (~1.8 mPas) are shown as a function of (A) entrainment speed and (B) reduced velocity, and the corresponding data for the high viscosity lubricants (~4.6 mPas) in (C) and (D).