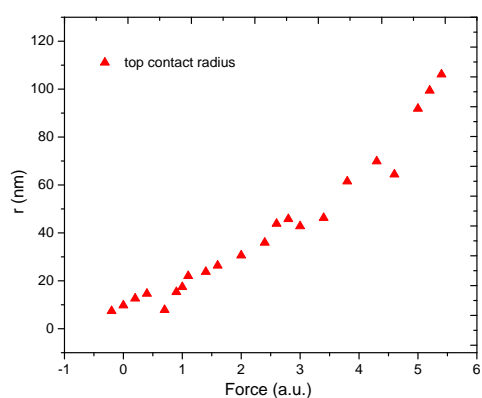**Supporting information**

Figure 1: Contact radius calculated from a set of experimental I-V curves using Eq.(21), at different load AFM tip forces. Measurements start when tip is just in contact with the surface of the Ag_2S (smallest contact radius) followed by an increase of the tip-sample interaction.