

Table S1. Adsorption energy of long chain polysulfides (Li_2S_x , $x=4,6,8$) on the Al-doped graphene substrate.

Substrate	Adsorption energy [eV]
Li_2S_4	-2.19
Li_2S_6	-2.32
Li_2S_8	-2.31

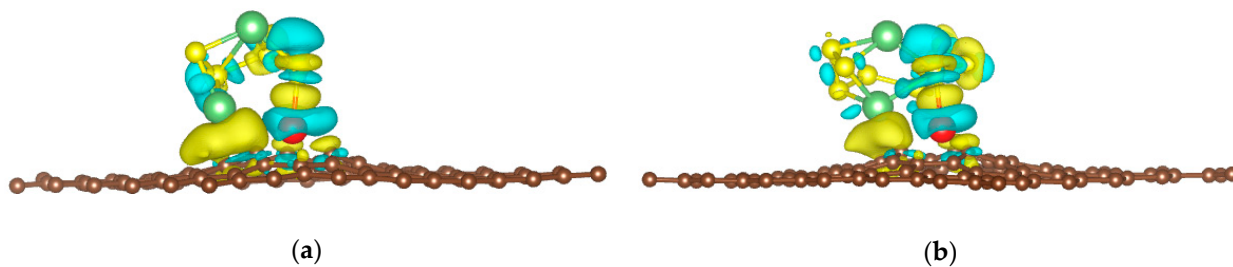


Figure S1. (a) Iso-surface (yellow color: negative, charge accumulation; cyan color: positive, charge depletion) of differential charge density for the most stable configurations of Li_2S_4 (a) and Li_2S_8 (b) on the Al-doped graphene. The plotted iso-level is $1.5 \times 10^{-3} \text{ e/Bohr}^3$. These densities have to be compared to figure 7 in the main text: no relevant modification of the differential electron densities is observed as a function of the polysulfide length.