Supporting Information

Multidentate Polysarcosine-Based Ligands for Water-Soluble Quantum Dots

Ana Fokina[1,2‡], Kristina Klinker[1,2‡], Lydia Braun[1], Byeong Guk Jeong[3,4], Wan Ki Bae[3], Matthias Barz[1], Rudolf Zentel[1]**

[1]Institute for Organic Chemistry Johannes Gutenberg-Universität Mainz, Duesbergweg 10-14, 55128 Mainz, Germany

[2]Graduate School Materials Science in Mainz, Staudinger Weg 9, 55128 Mainz, Germany

[3]Photo-Electronic Hybrids Research Center, National Agenda Research Division, Korea Institute of Science and Technology, 14-gil 5, Hwarang ro, Seongbuk gu, Seoul 02792, Korea

[4]School of Chemical and Biological Engineering, The National Creative Research Initiative Center for Intelligent Hybrids, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Korea

^{1}H NMR Characterization

Anchor Compounds

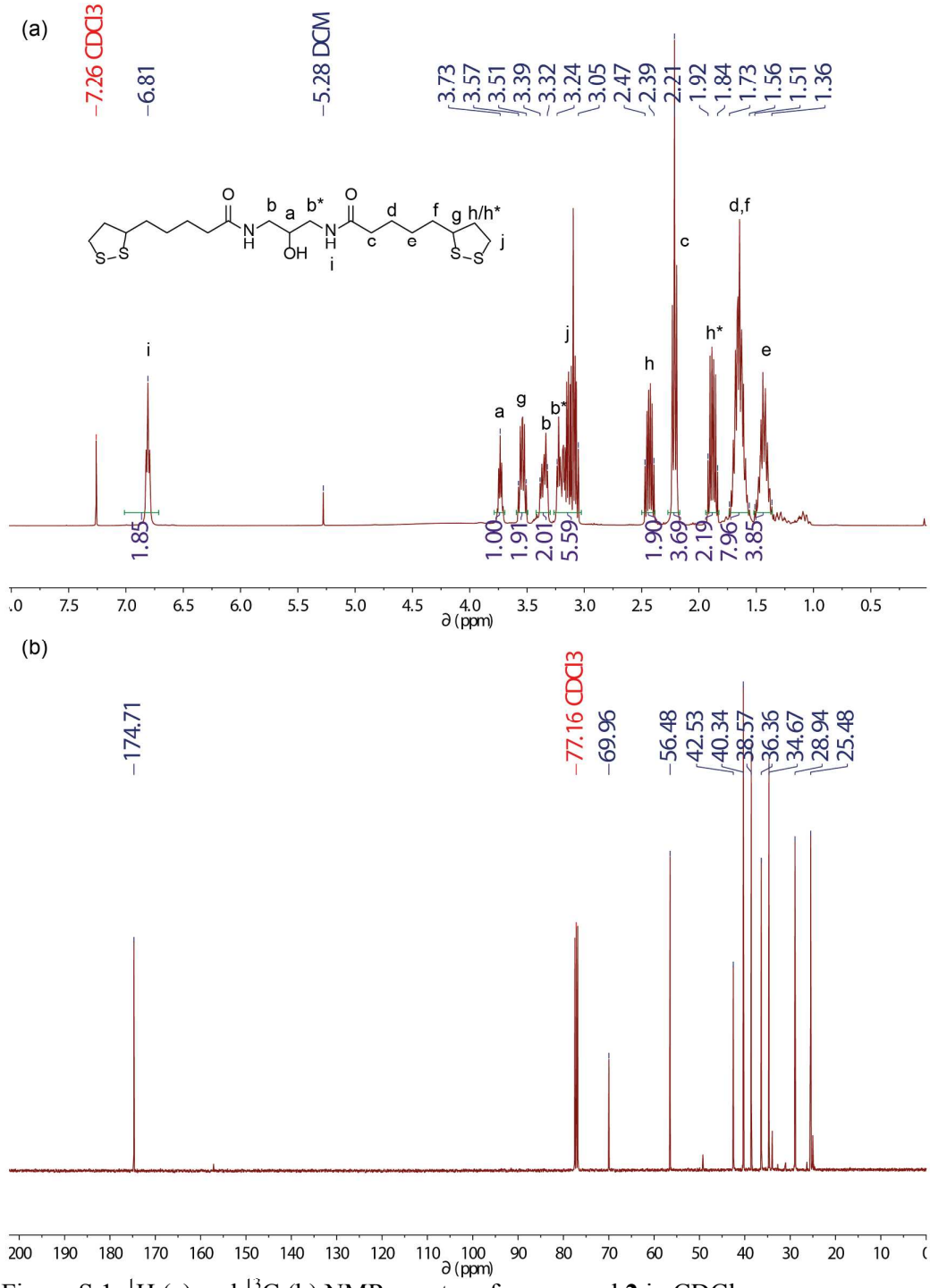

Figure S 1. ^{1}H (a) and ^{13}C (b) NMR spectra of compound **2** in $CDCl_3$.

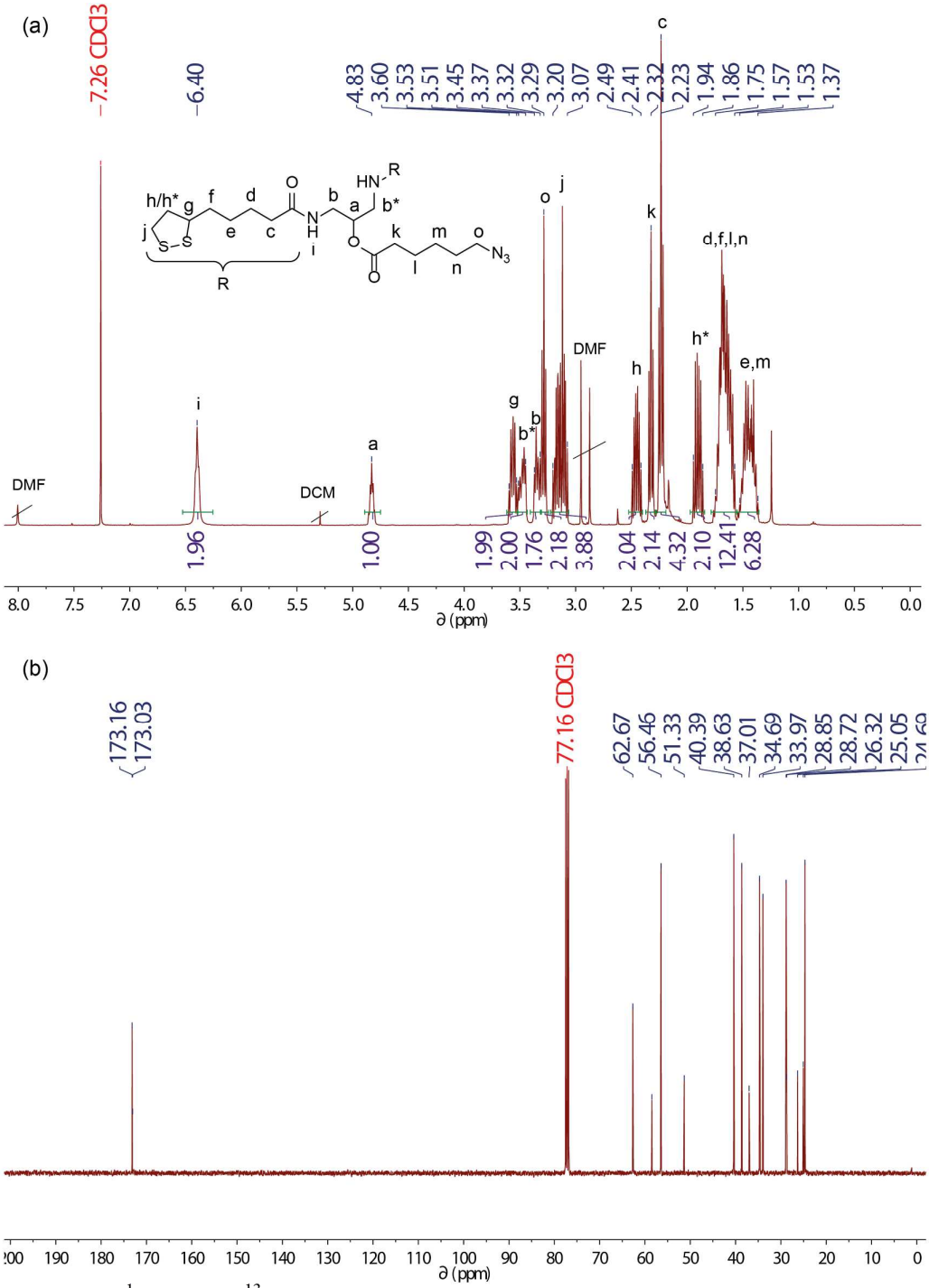

Figure S 2. ^{1}H (a) and ^{13}C (b) NMR spectra of compound **A1** in $CDCl_3$.

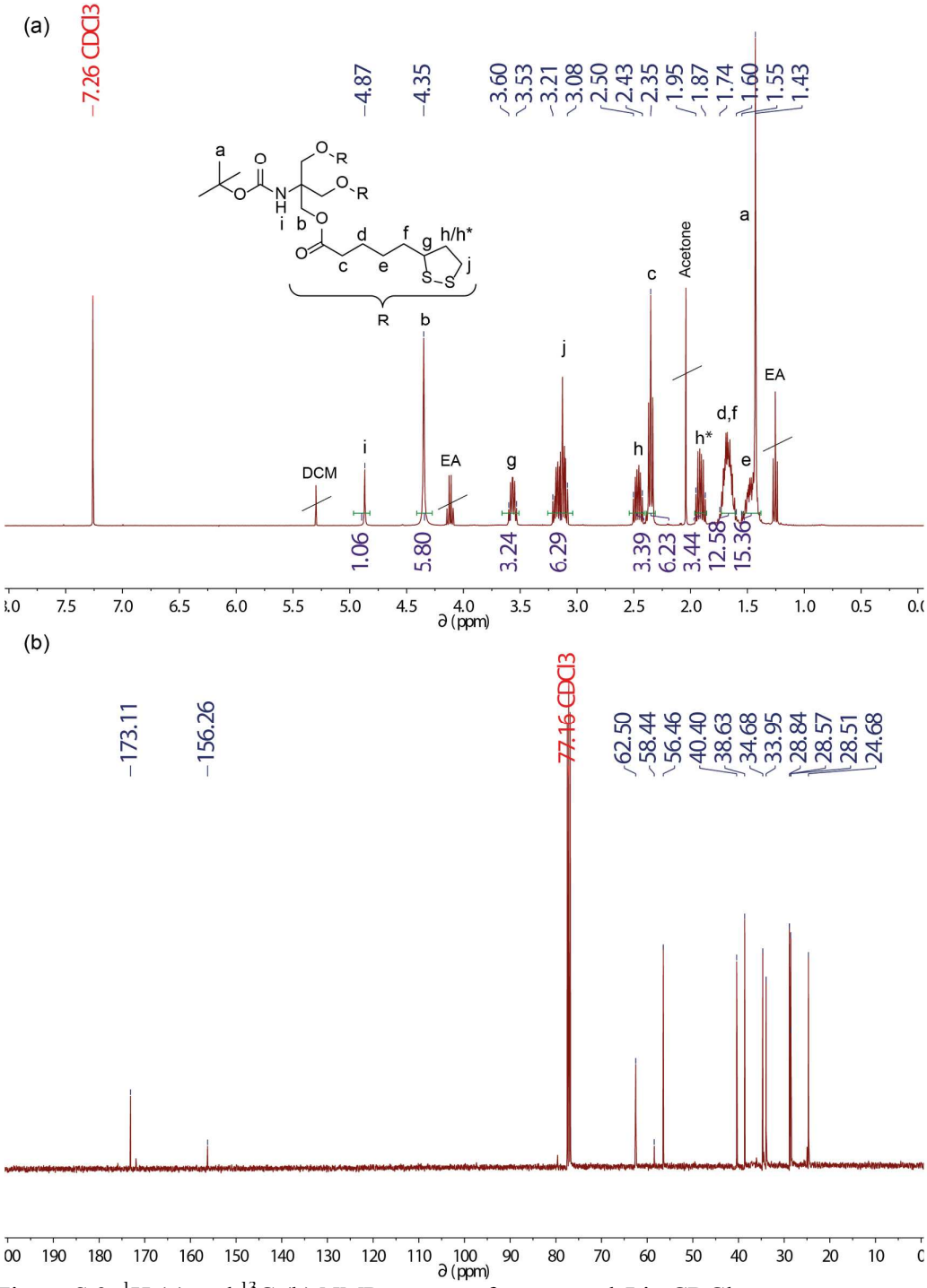

Figure S 3. ^{1}H (a) and ^{13}C (b) NMR spectra of compound **5** in $CDCl_3$.

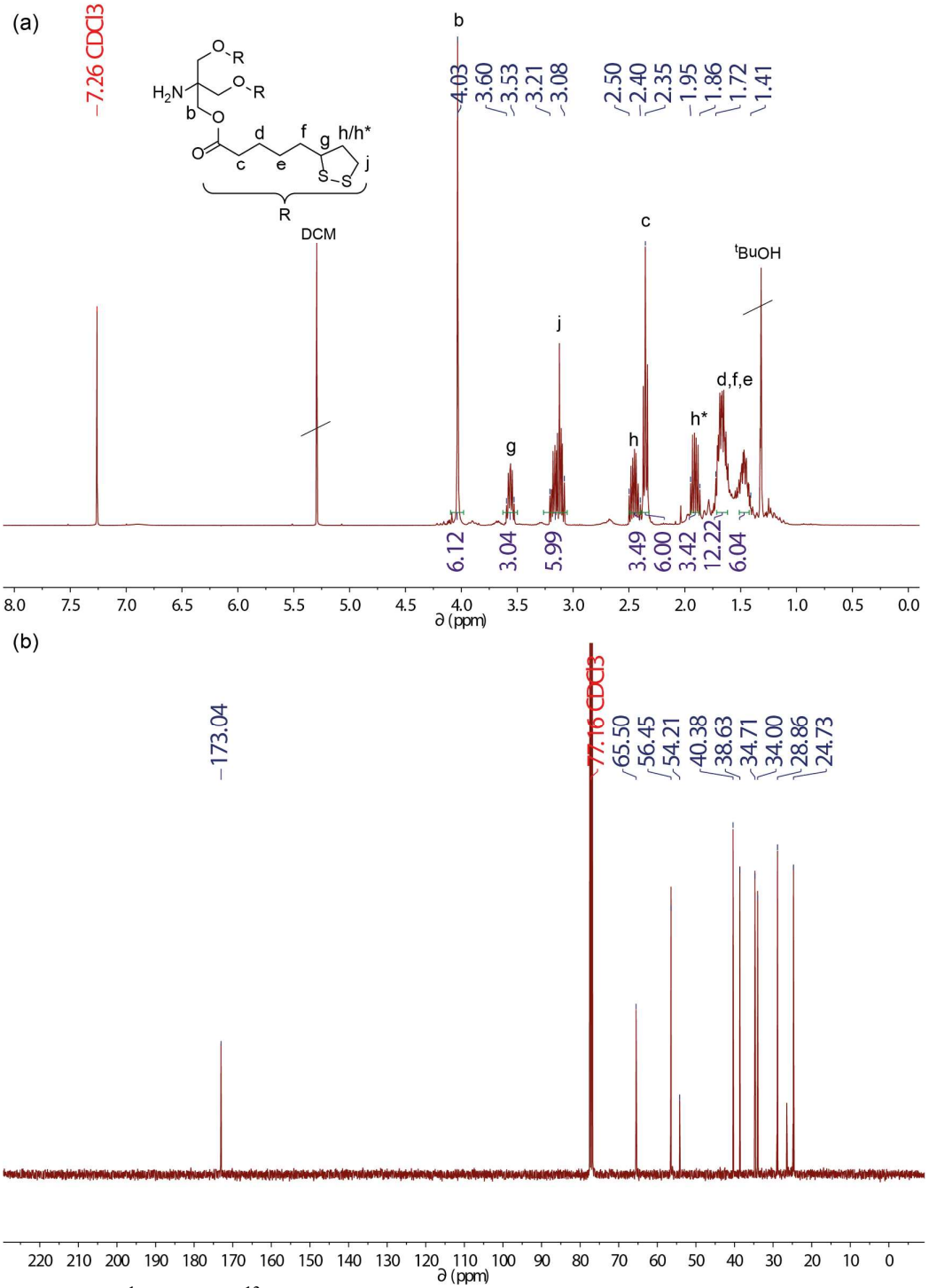

Figure S 4. ^{1}H (a) and ^{13}C (b) NMR spectra of compound **6** in $CDCl_3$.

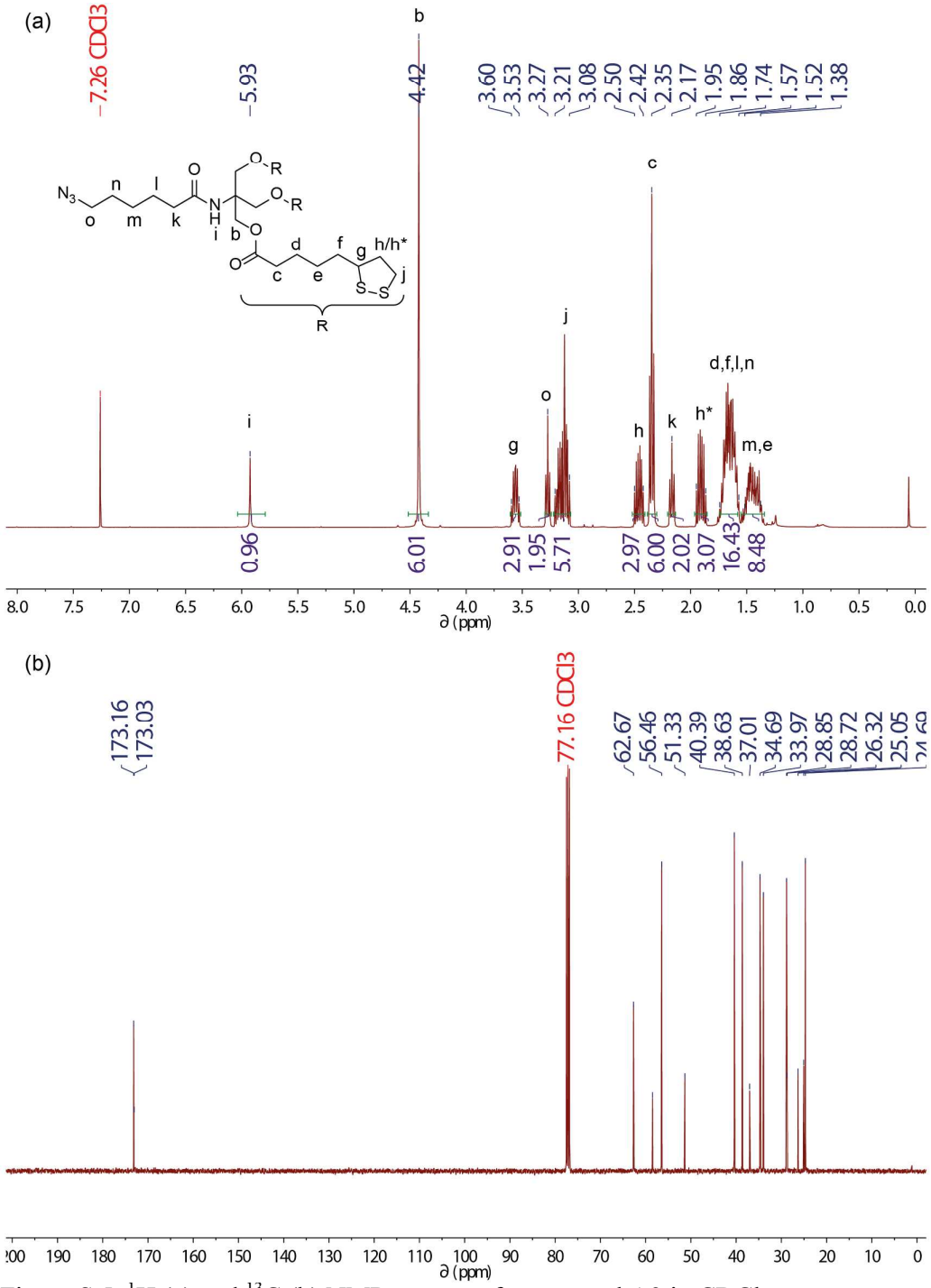

Figure S 5. ^{1}H (a) and ^{13}C (b) NMR spectra of compound **A2** in $CDCl_3$.

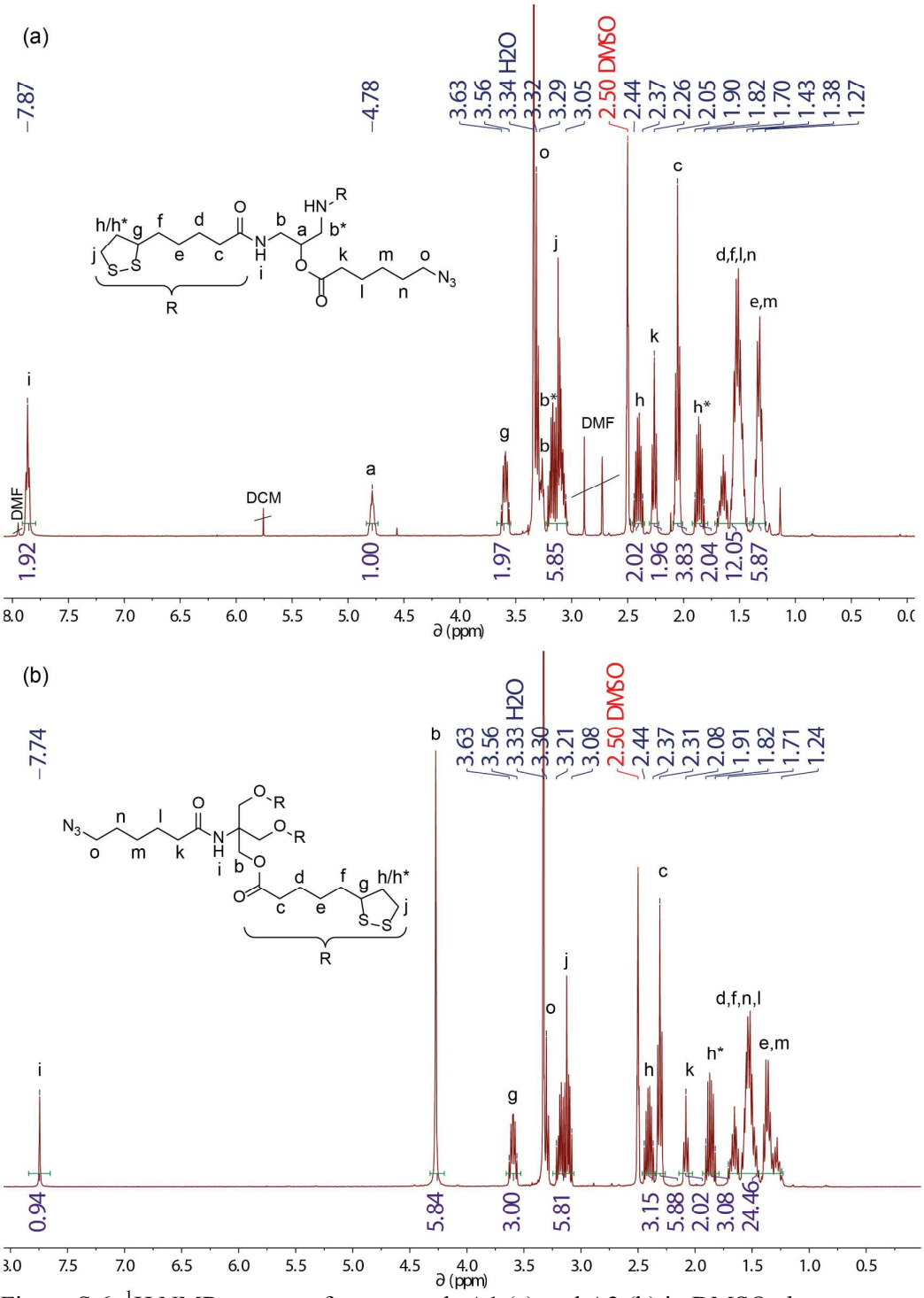

Figure S 6. ^{1}H NMR spectra of compounds **A1** (a) and **A2** (b) in DMSO-d_6.

End-capped Precursor Polymers

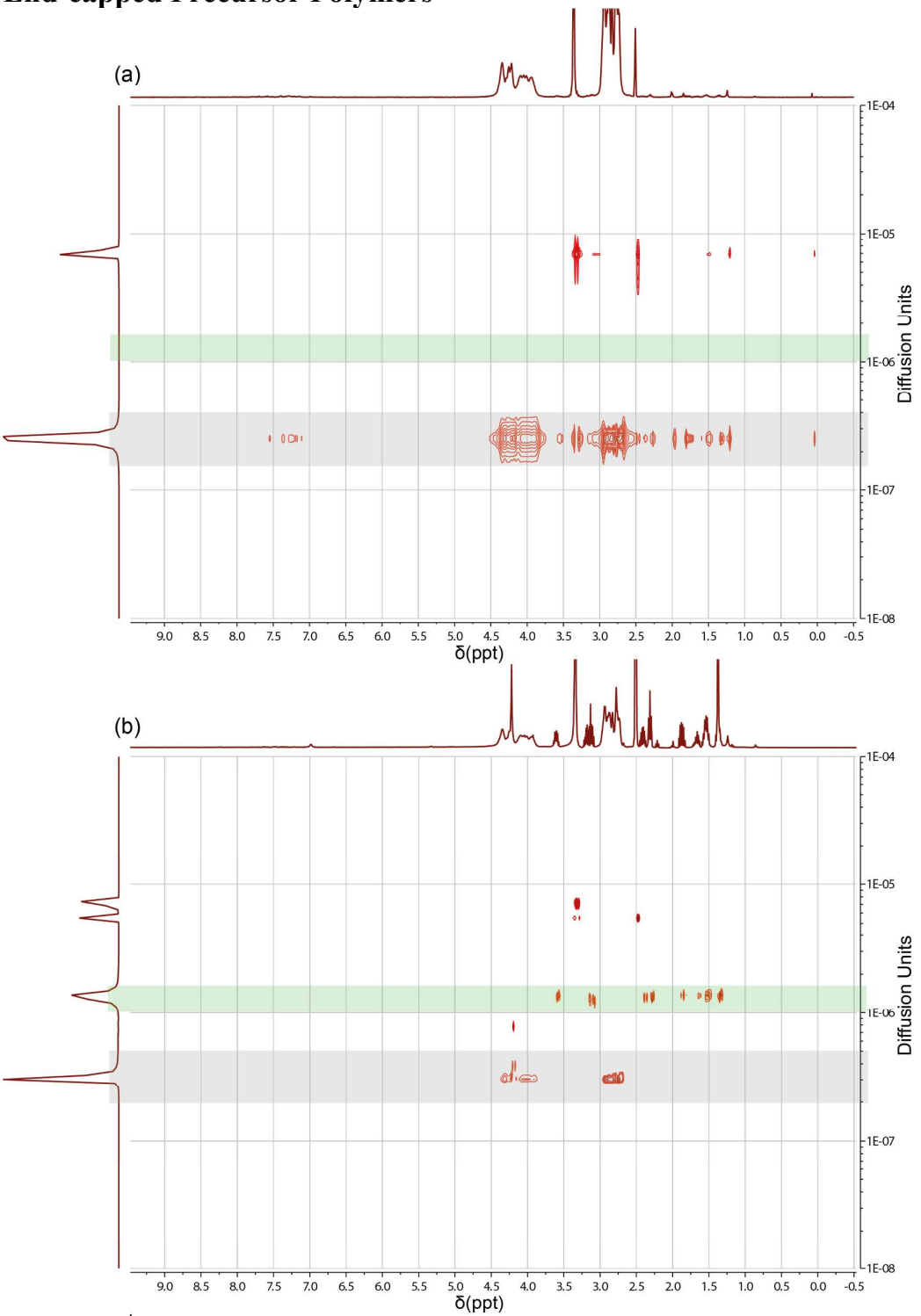

Figure S 7. ^{1}H DOSY spectra of PL2a (a) and a mixture of DBCO-PSar and compound **5** (b). The green line marking the diffusion area of the compound **5** and the gray line marking the diffusion are of PSar-based **PL2a** and DBCO-PSar.

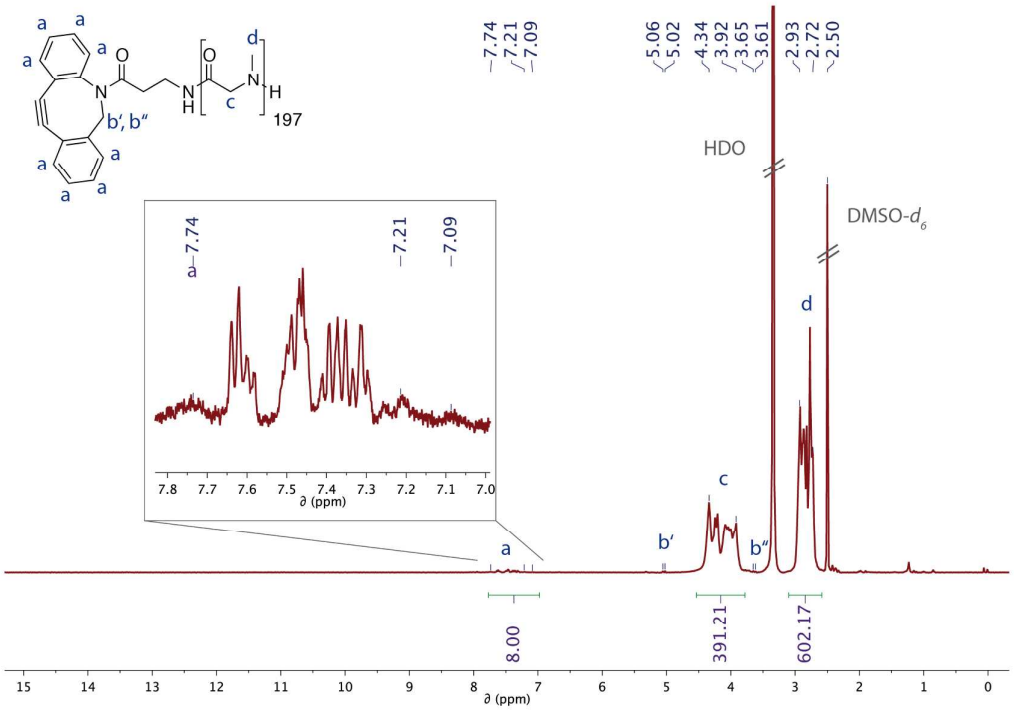

Figure S 8. ^{1}H NMR (400 MHz) of PSar-DBCO (PC1) in DMSO-d6.

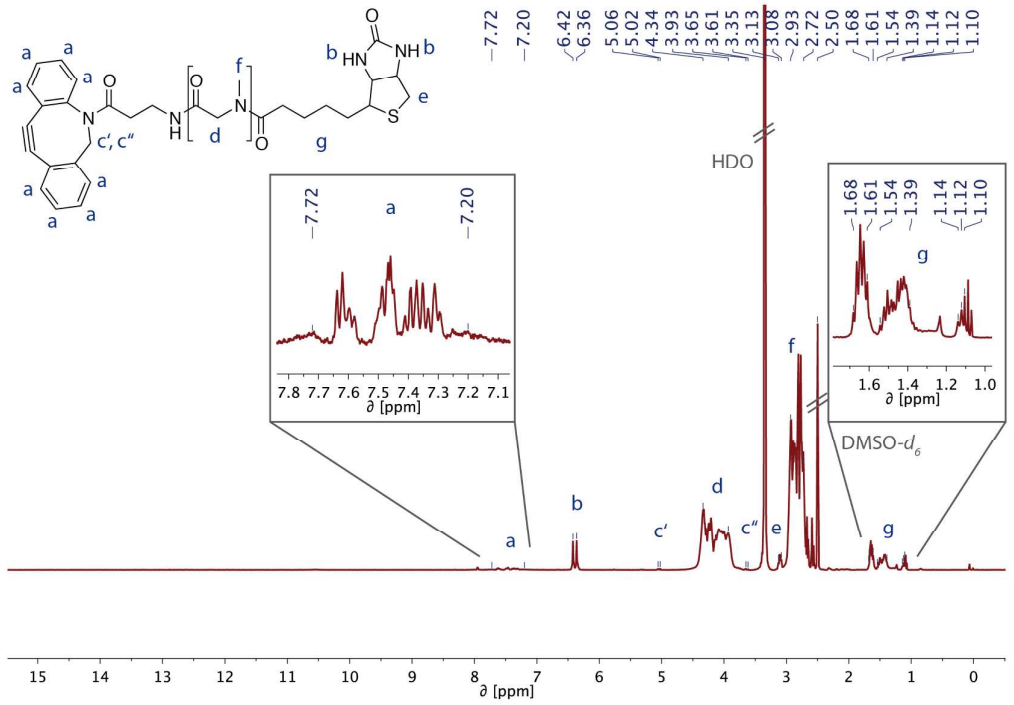

Figure S 10: ^{1}H NMR spectrum (400 MHz) of PSar-DBCO-biotin (PC3) in DMSO-d_6 (before purification of excess biotin-NHS ester).

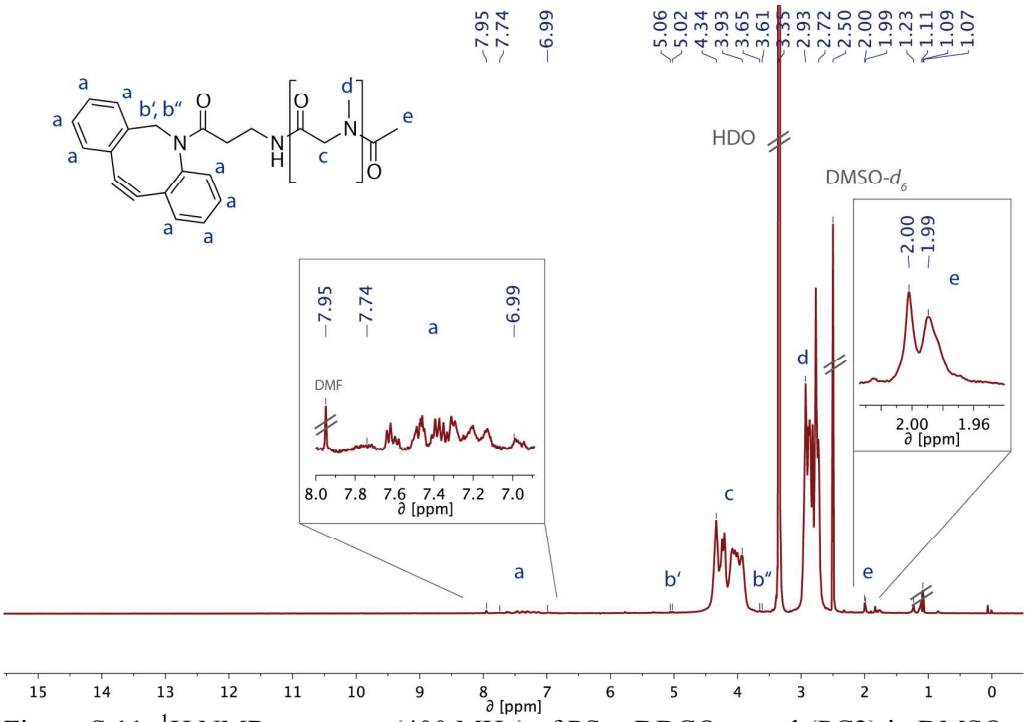

Figure S 11: ^{1}H NMR spectrum (400 MHz) of PSar-DBCO-acetyl (PC2) in DMSO-d_6.

Functionalization with Lipoic Acid Di- and Trifunctional Linkers

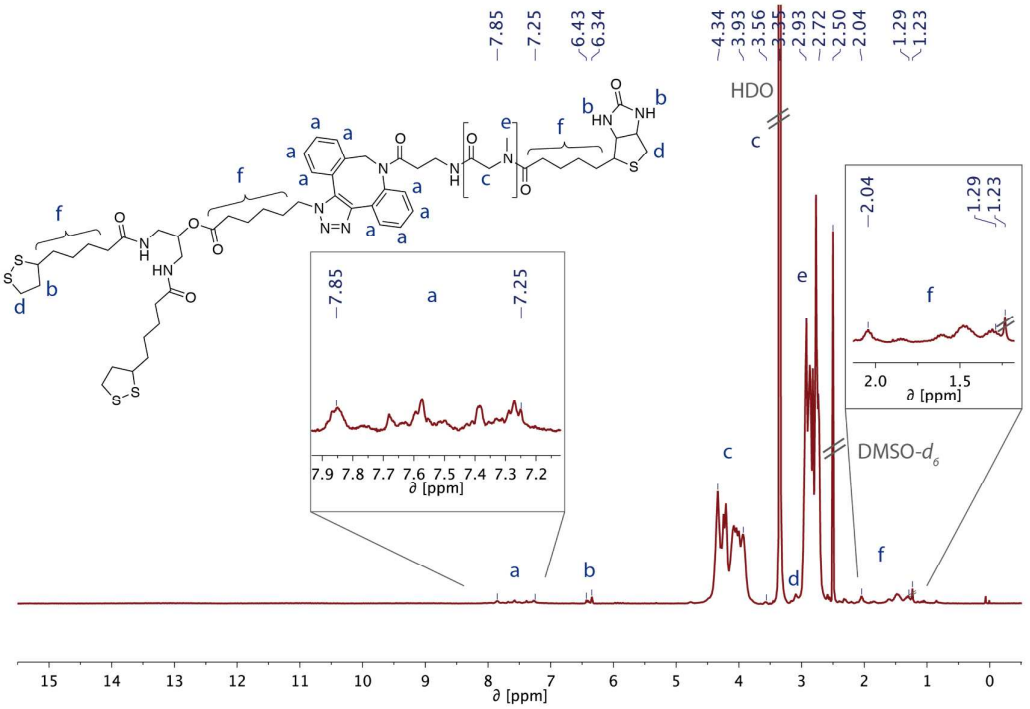

Figure S 12: ^{1}H NMR spectrum (400 MHz) of diliponate-PSar-biotin (PL1b) in DMSO-d_6.

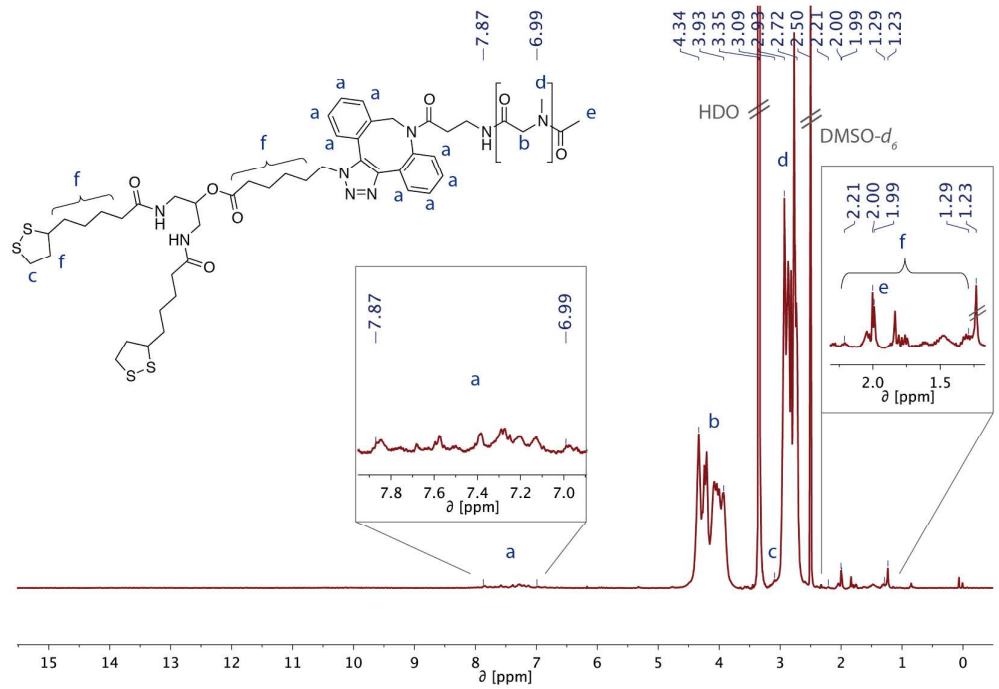

Figure S 13: ^{1}H NMR spectrum (400 MHz) of diliponate-PSar-acetyl (PL1a) in DMSO-d_6.

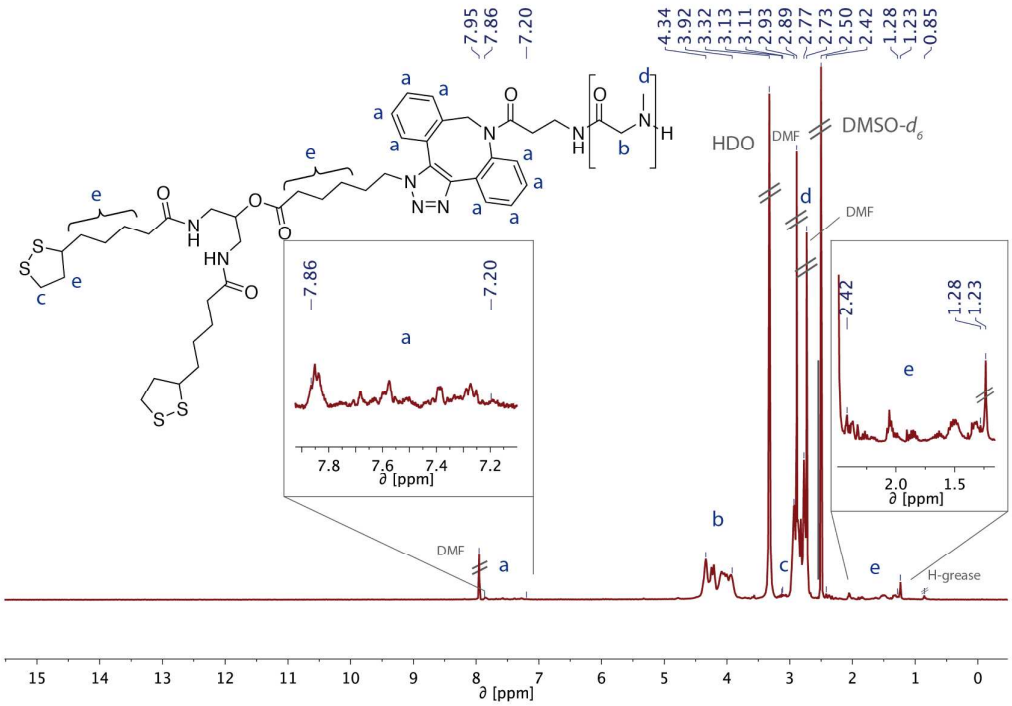

Figure S 14: ^{1}H NMR spectrum (400 MHz) of diliponate-PSar (PL1c) in DMSO-d_6.

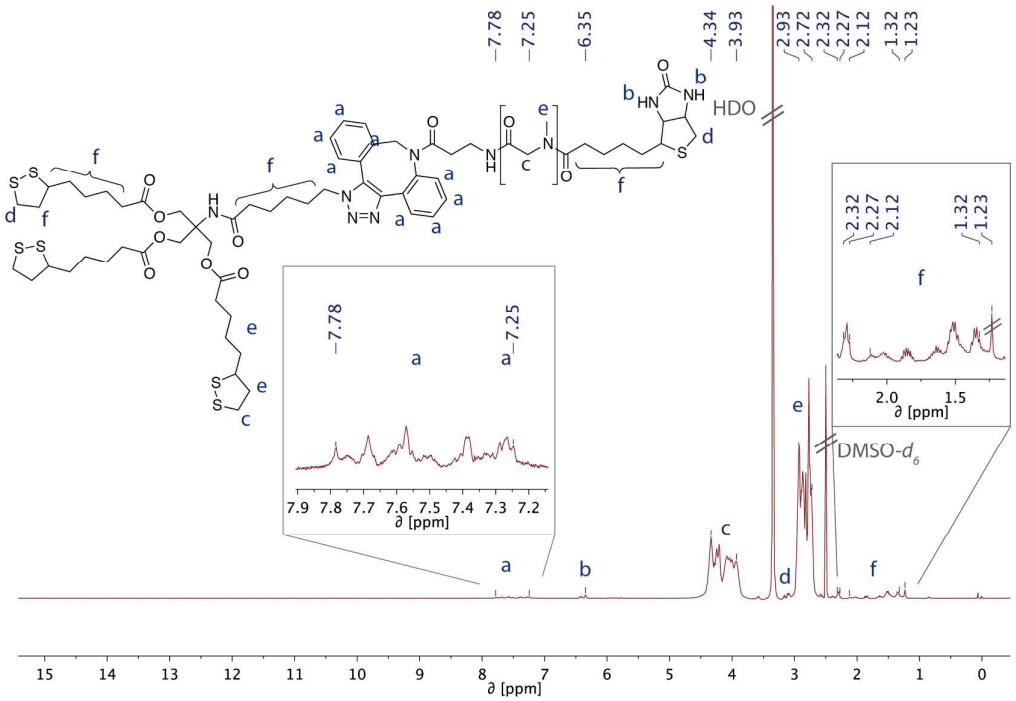

Figure S 15: ^{1}H NMR spectrum (400 MHz) of triliponate-PSar-biotin (PL2b) in DMSO-d_6.

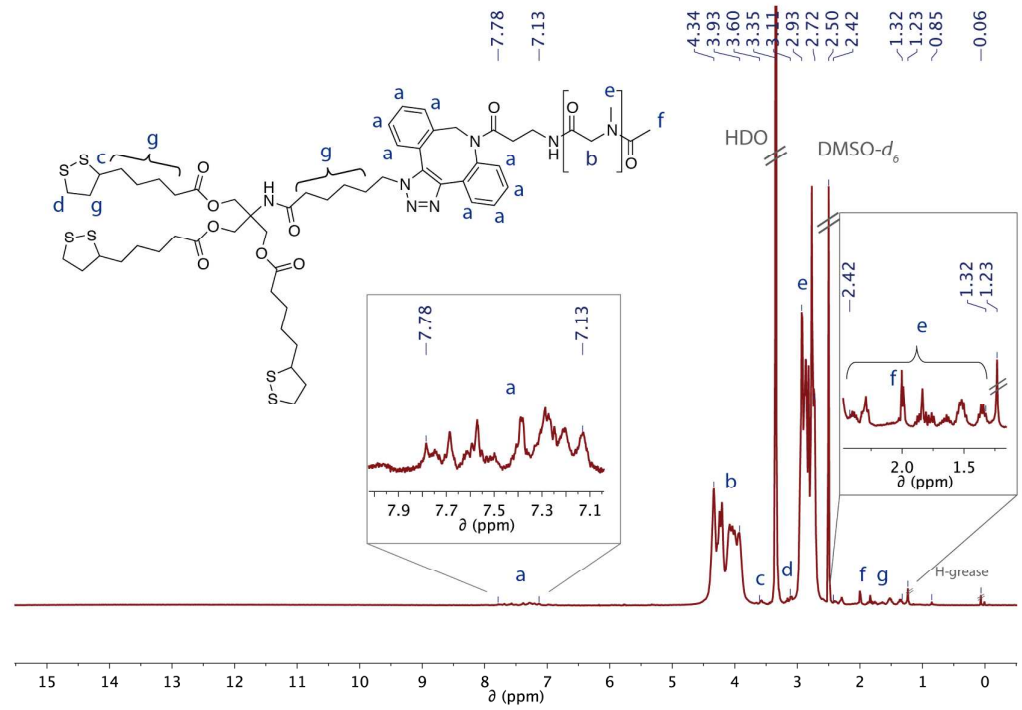

Figure S 16: ^{1}H NMR spectrum (400 MHz) of triliponate-PSar-acetyl in DMSO-d_6.

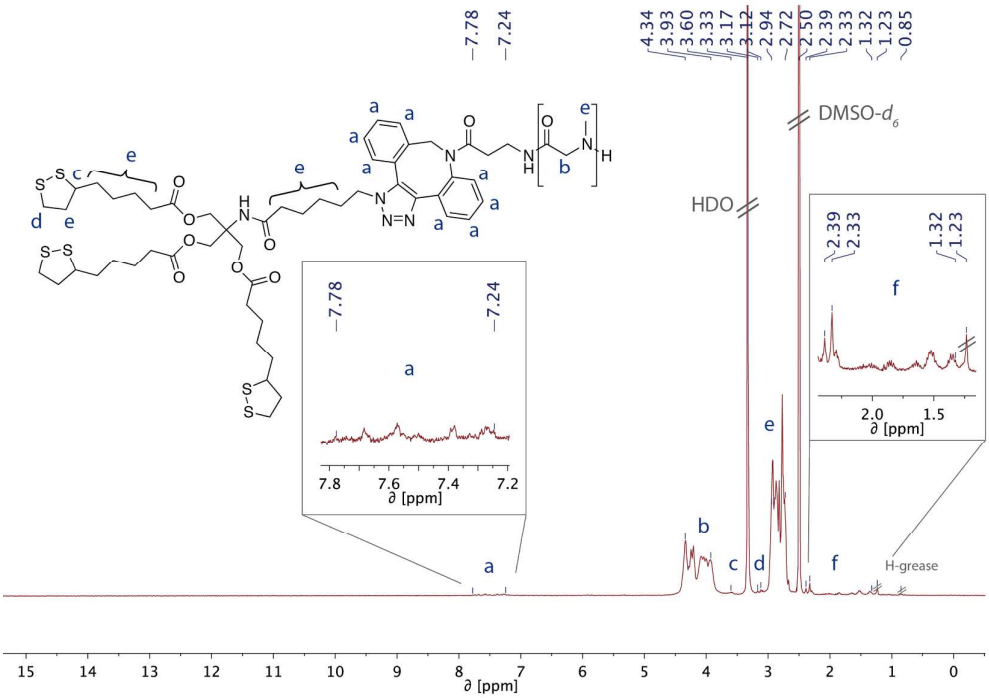

Figure S 17: ^{1}H NMR spectrum (400 MHz) of triliponate-PSar in DMSO-d_6.

GPC Characterization:

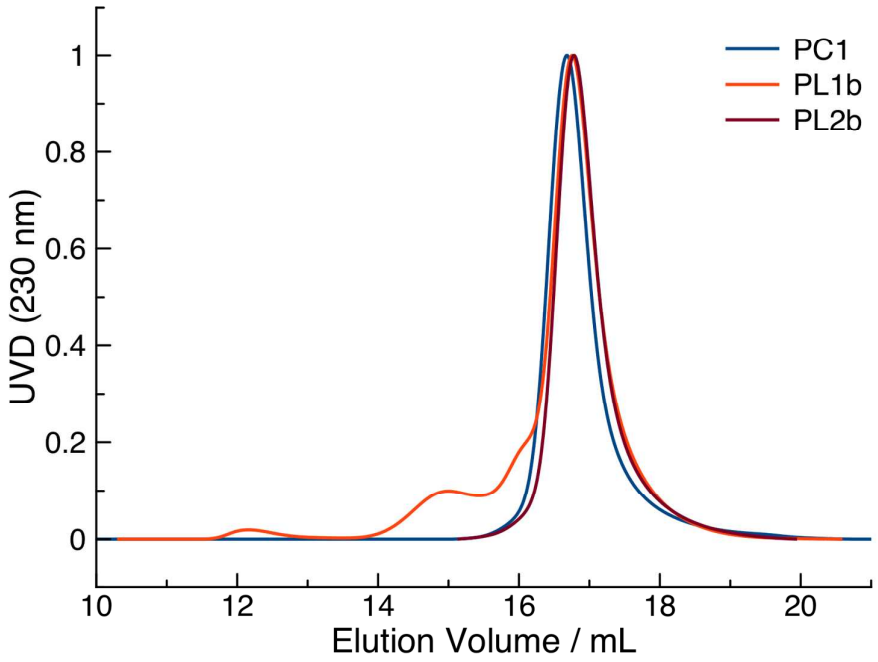

Figure S 18: GPC elugram (in HFIP) of **PC1**, **PL1b** and **PL2b** (di- and trilipoic acid anchors and biotin as post polymerization modification respectively). High molecular

weight tailing of **PL1b** can be explained by cross-linking of polymer chains due the dynamic nature of disulfides.

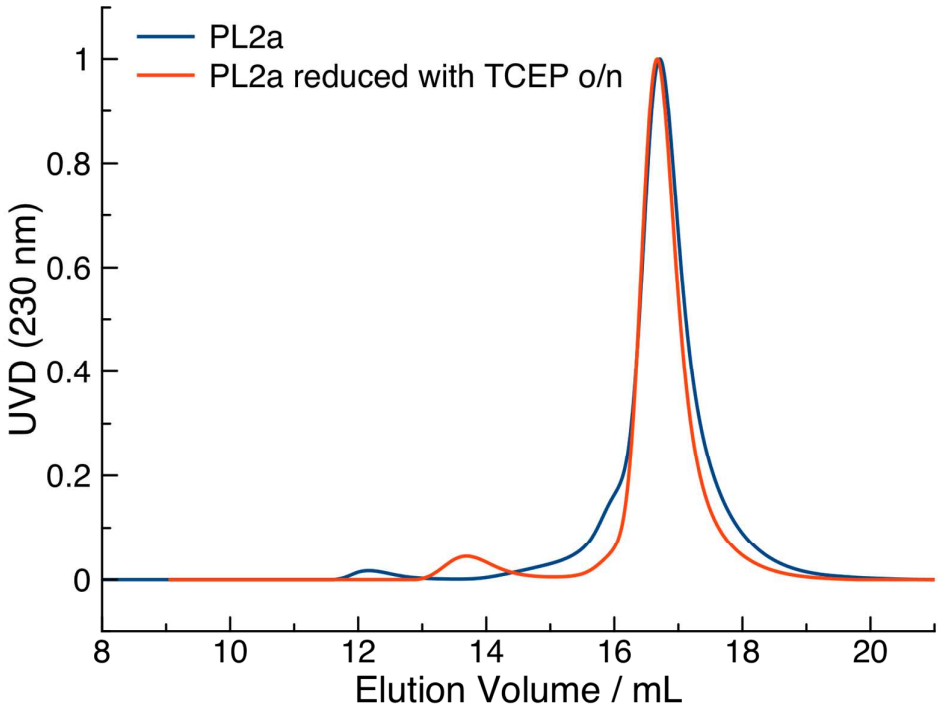

Figure S 19: GPC elugram (in HFIP) of **PL2a** before and after reduction with TCEP overnight.

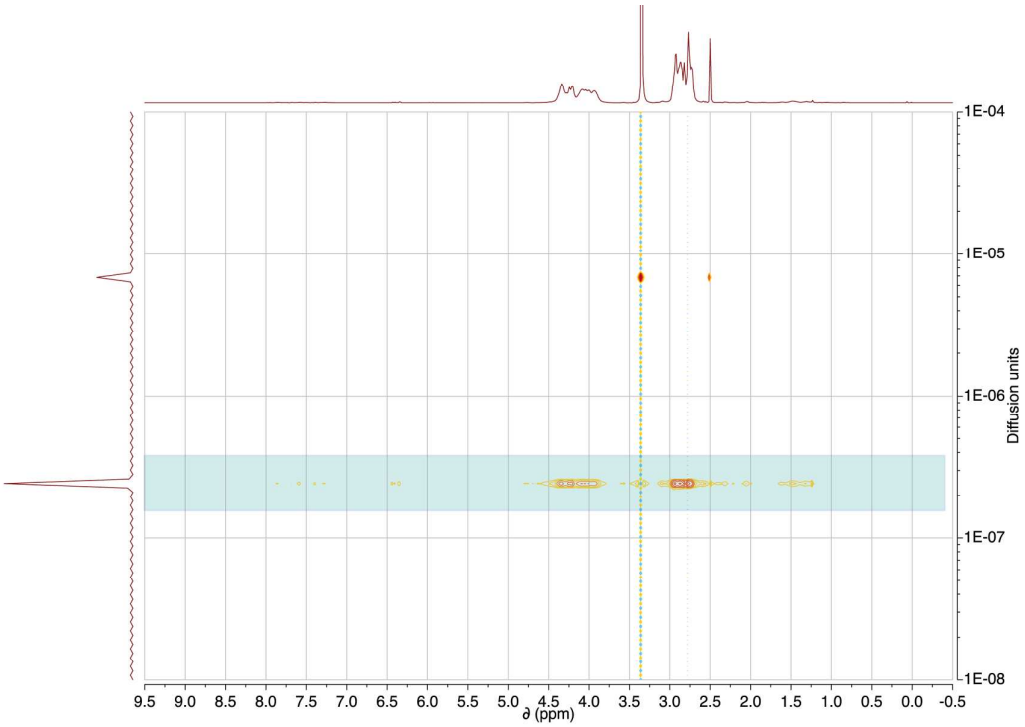

Figure S 20: ^{1}H DOSY NMR in DMSO-d_6 of **PL2a**.

AFM Images and Particle Statistics

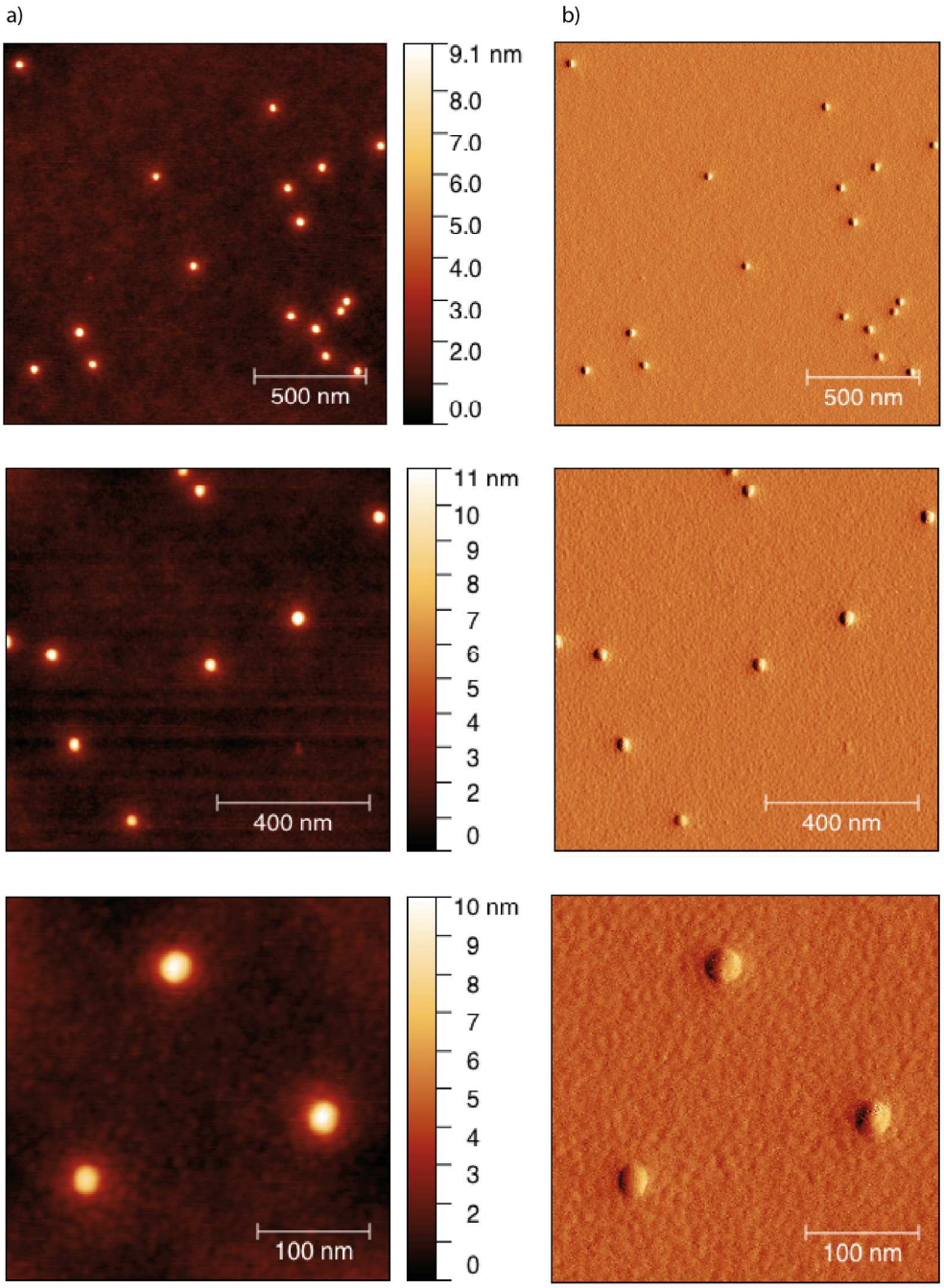

Figure S 21: AFM images (tapping mode) of QD@**PL1a** dried on Mica with a) height image and b) amplitude image.

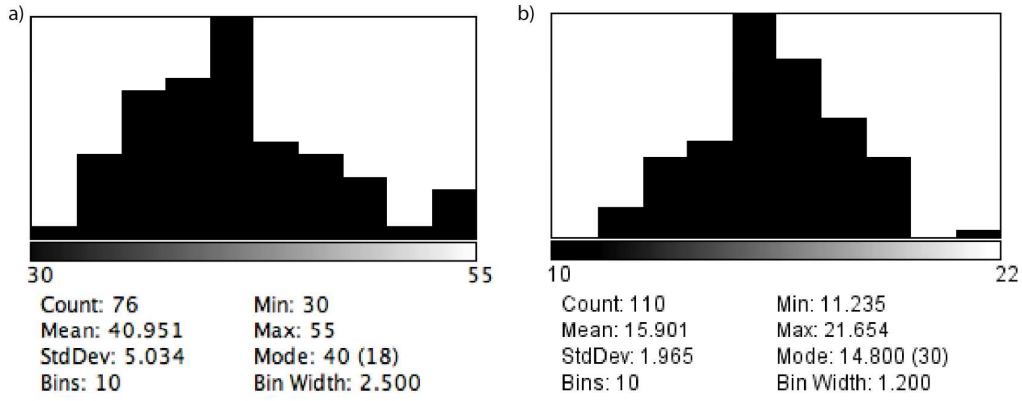

Figure S 22: Statistics of QD@**PL1a** obtained by counting of individual particles using ImageJ software for a) AFM and b) TEM. AFM data was analysed under the assumption that tip geometry is negligible.

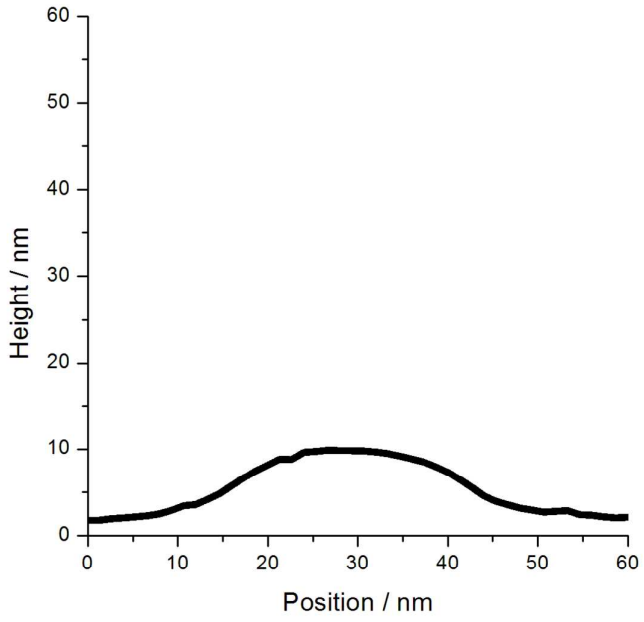

Figure S 23: AFM height profile of QD@**PL1a**.