**Supporting Information for:**

# Colloidal Synthesis of Monodisperse Semiconductor Nanocrystals through Saturated Ionic Layer Adsorption.

*Natalia Razgoniaeva,* [1,2] *Luis Carrilo,*[4] *Pavel Moroz,*[1,2] *Douglas Burchfield,*[1,3] *Prakash Adhikari*[,2]
*Priyanka Yadav,* [2] *Dmitriy Khon,*[4] *Mikhail Zamkov*[1,2,*].

The Center for Photochemical Sciences[1], Department of Physics[2] and Department of Chemistry[3], Bowling Green State University, Bowling Green, Ohio 43403. Department of Chemistry and Biochemistry[4], St. Mary's University, San Antonio, Texas, 78228.

Corresponding author: zamkovm@bgsu.edu; Tel: 419-372-0264; Fax: 419-372-9938

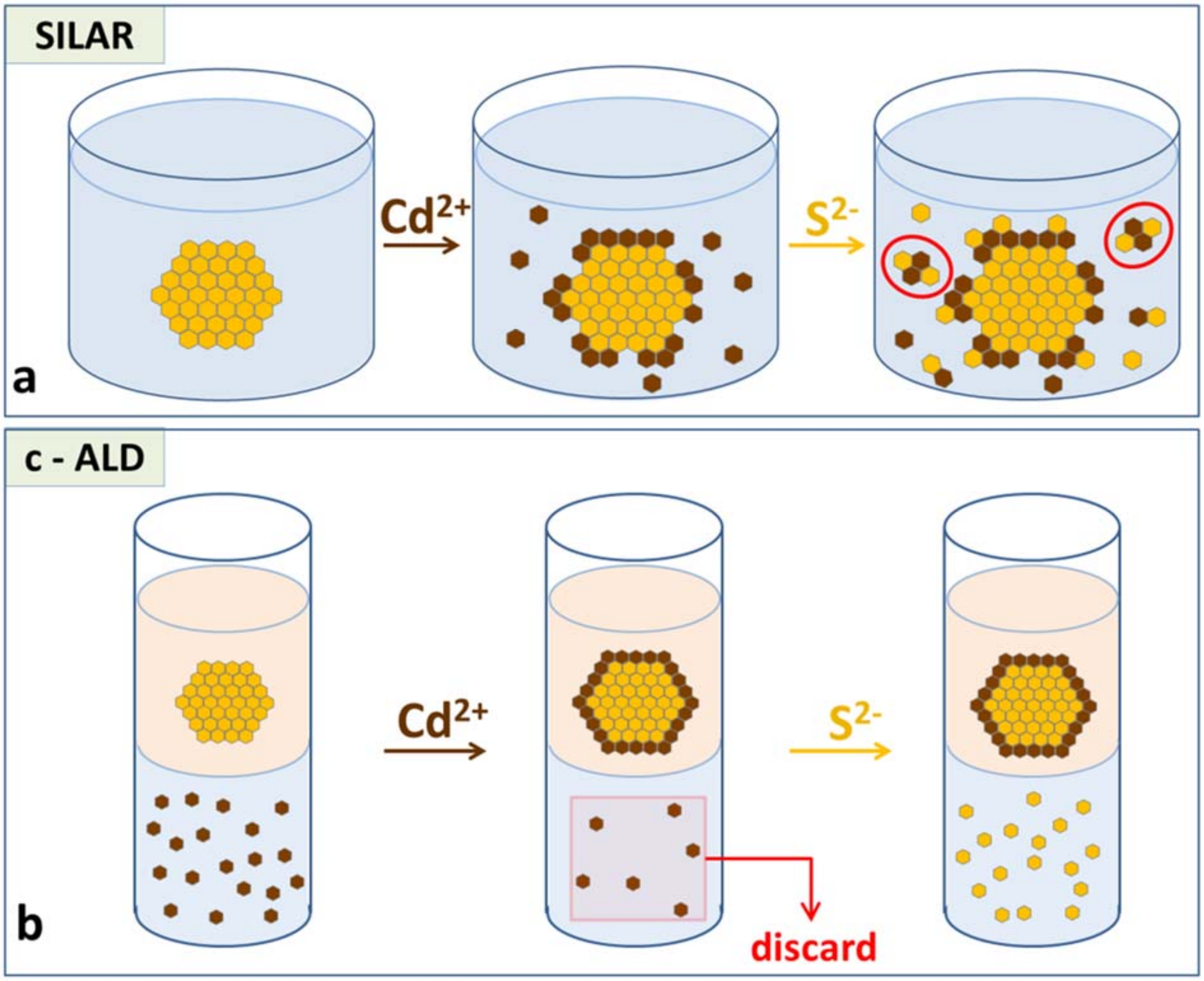


**Figure SF1.** A schematic illustration of the key differences between SILAR and c-ALD techniques for the nanocrystal shell growth. (a). The SILAR synthesis is performed in a single-phase reaction mixture, which results in the accumulation of unreacted precursors causing the secondary nucleation (at high precursor concentrations) or sub-monolayer growth (at low precursor concentrations). (b). The c-ALD employs a two-phase growth mixture, which is designed to separate precursors from nanoparticles. As a result, unreacted precursors can be removed after the half-monolayer (cationic or anionic) is grown.

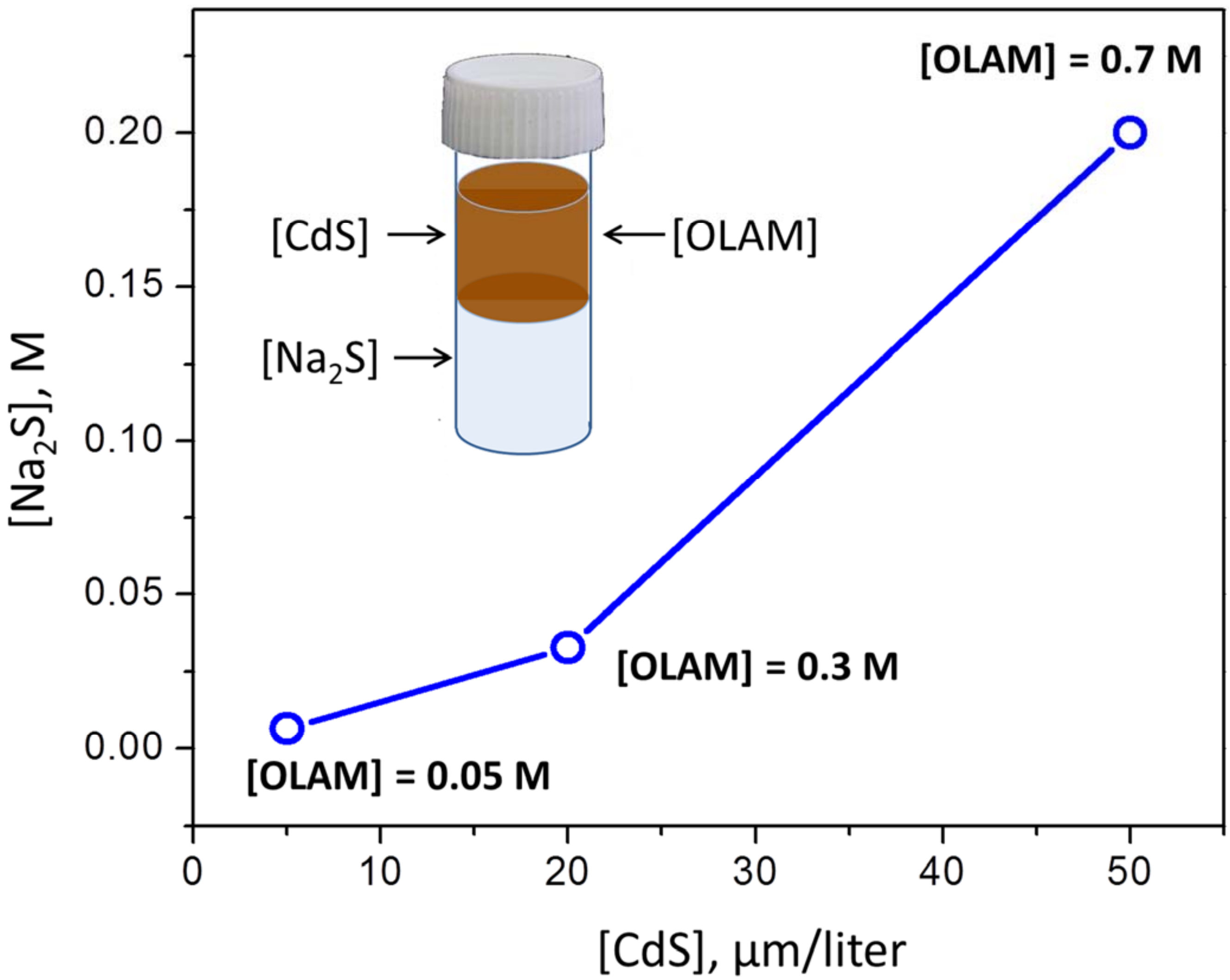


**Figure SF2**. The relationship between the minimal concertation of the $Na_2S$ precursor in the formamide layer (needed for a saturated half-monolayer growth) and the concentration of CdS seeds in the toluene phase. The minimal concertation of OLAM (for stabilizing nanocrystals in the non-polar phase) is indicated for each measurement.

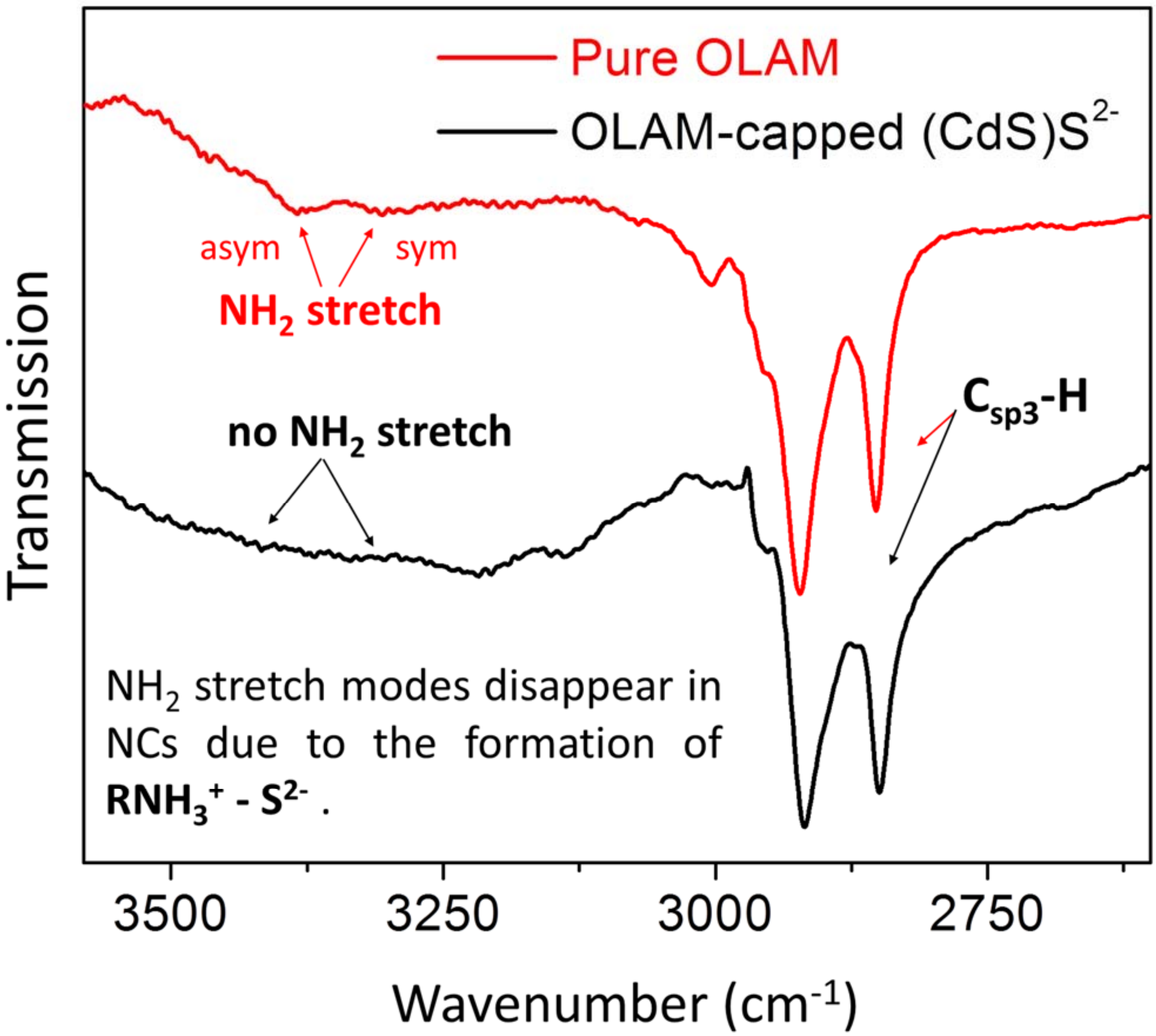

**Figure SF3**. FTIR spectra of the OLAM-capped $(CdS)S^{2-}$ NCs (black curve) and pure OLAM (red curve). The absence of the $NH_2$ stretch modes tells us that OLAM attaches to the surface of nanoparticles by forming a complex with the sulfur ion.

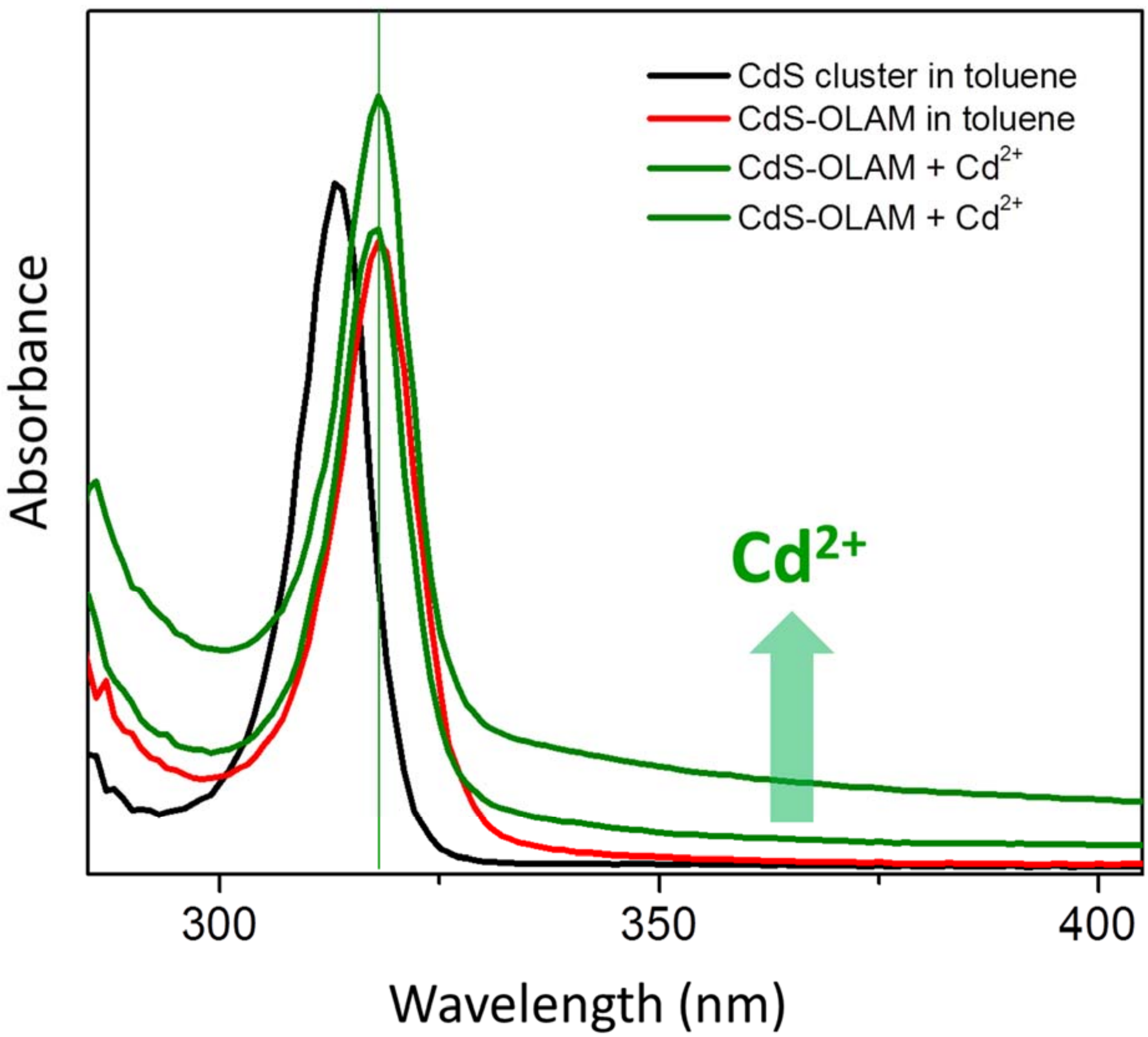

**Figure SF4**. Evolution of the $CdS_{318nm}$ cluster absorption profile upon reacting with increasing amount of $Cd(OAc)_2$ ions in solution. The position of the exciton peak does not red-shift indicating that the surface of the $CdS_{318}$ cluster is likely to be saturated with Cd.

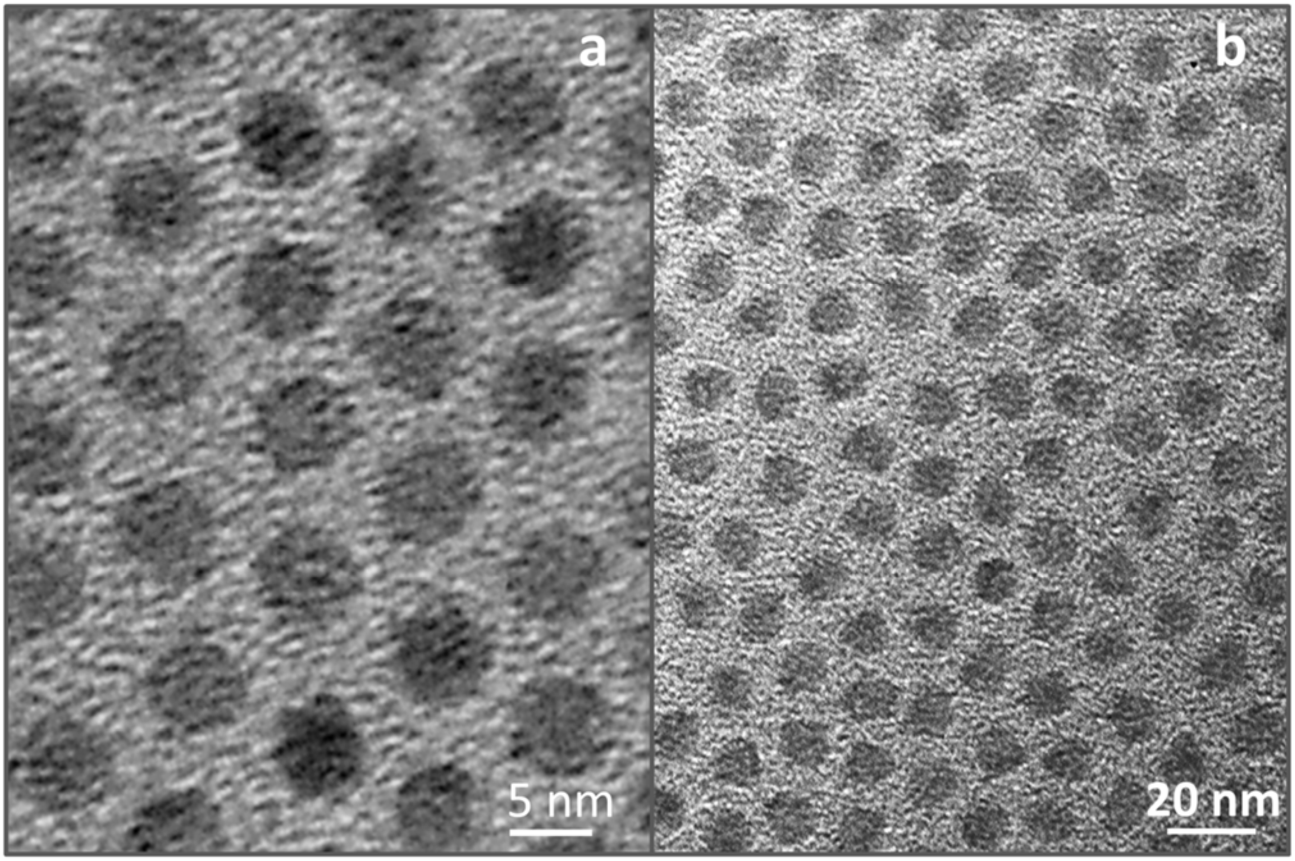


**Figure SF5**. Additional TEM images of CdS NCs grown by SILA technique. (a). $CdS_{390nm}$+4($CdS_1$) NCs grown to a full layer saturation (b). $CdS_{390nm}$+10($CdS_1$) NCs grown ***without*** full layer saturation.

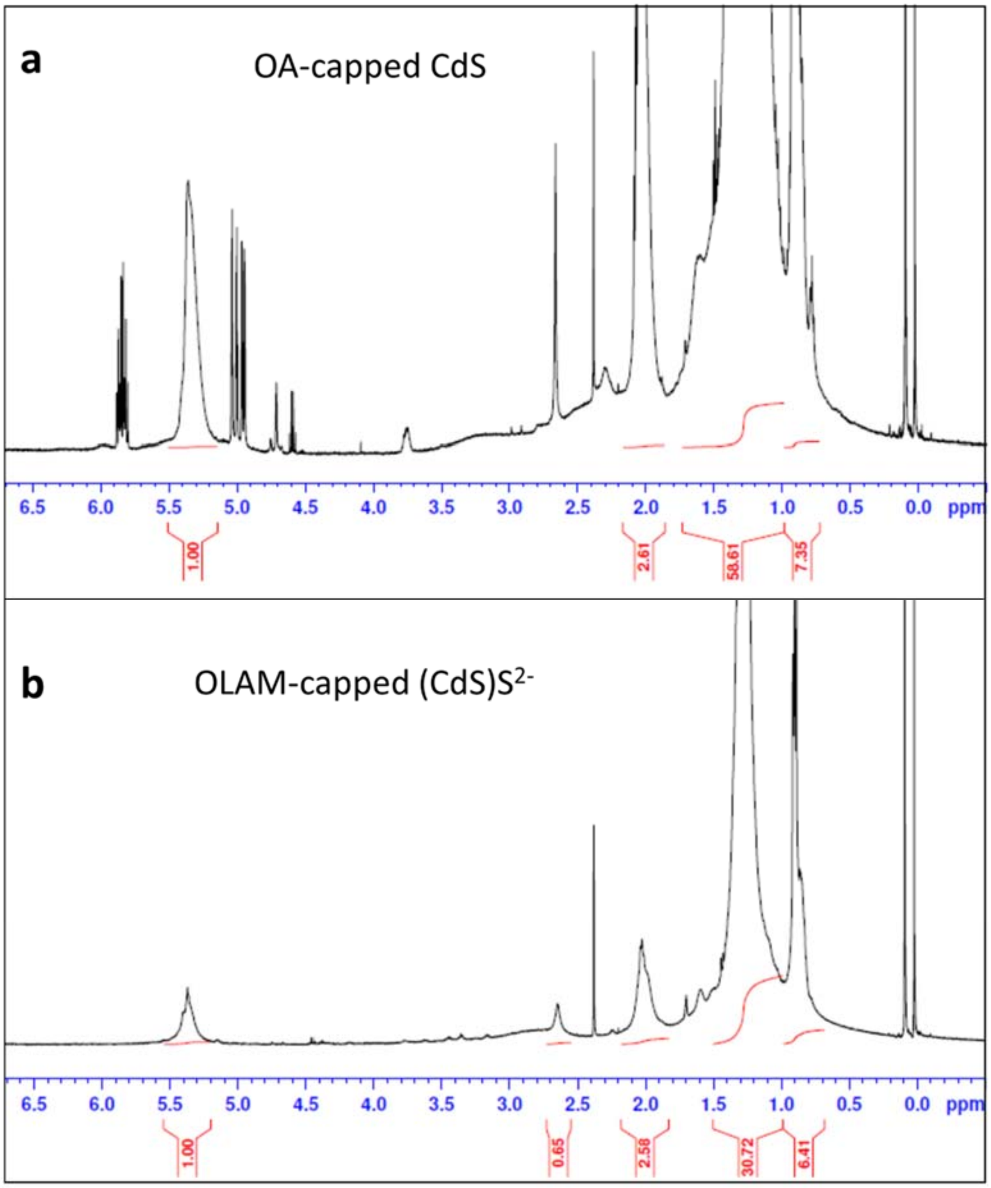


**Figure SF6.** $^{1}$H NMR spectra of (a). OA-capped CdS and (b). OLAM-capped $(CdS)S^{2-}$ NCs after the deposition of a sulfur layer.