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THE GOAL

Formation of nanocapsules by sequential adsorption of oppositely charged polyelectrolytes with quantum dots.

MATERIALS

Two different polyelectrolyte couples were used:

- Cationic poly(allyamine hydrochloride) (PAH) with anionic poly (sodium styrene sulfonate) (PSS)
- Cationic poly-L-lysine hydrobromide (PLL) with anionic poly-D-glutamic acid sodium salt (PGA) or PGA pegylated (PGA-y-PEG)

Negatively charged CdTe quantum dots applied in complexes with polyelectrolytes were purchased from PlasmaChem GmbH (Germany).

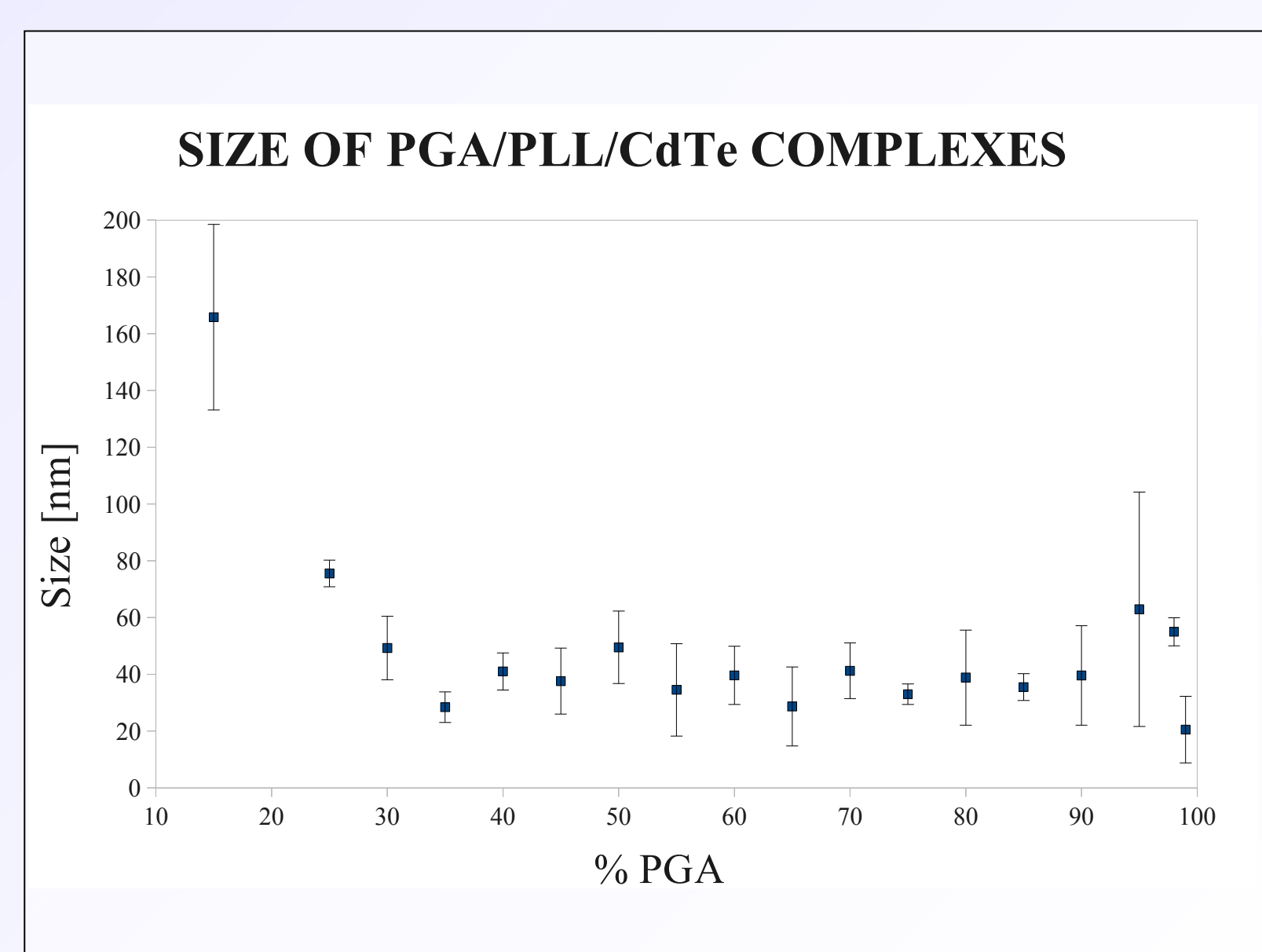
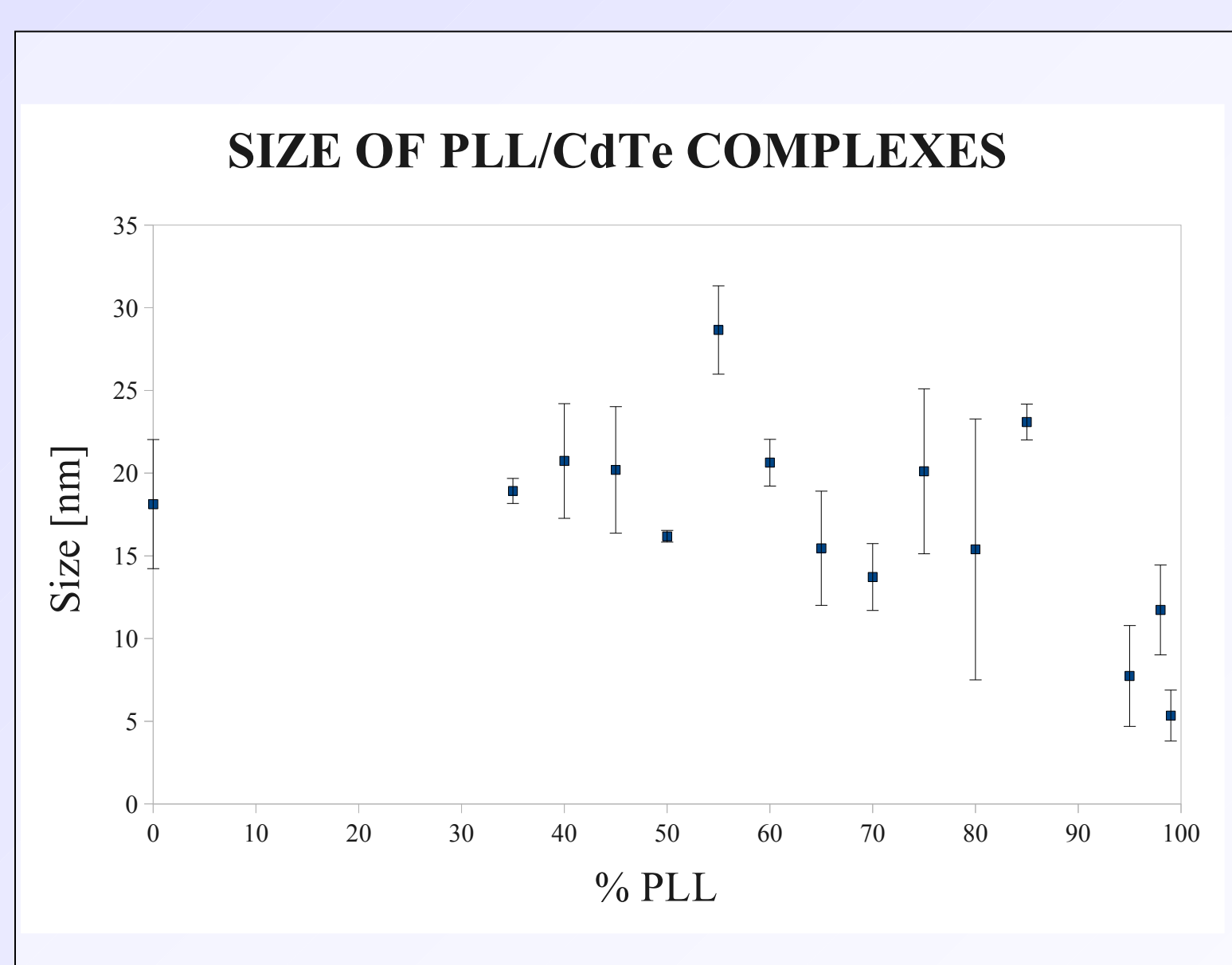
METHODS

- Dynamic light scattering (DLS) - determination of size and zeta potential of complexes
- Atomic force microscope (AFM) measurements of complexes deposited on mica
- Flow cytometer – determination of cytotoxicity of the capsules

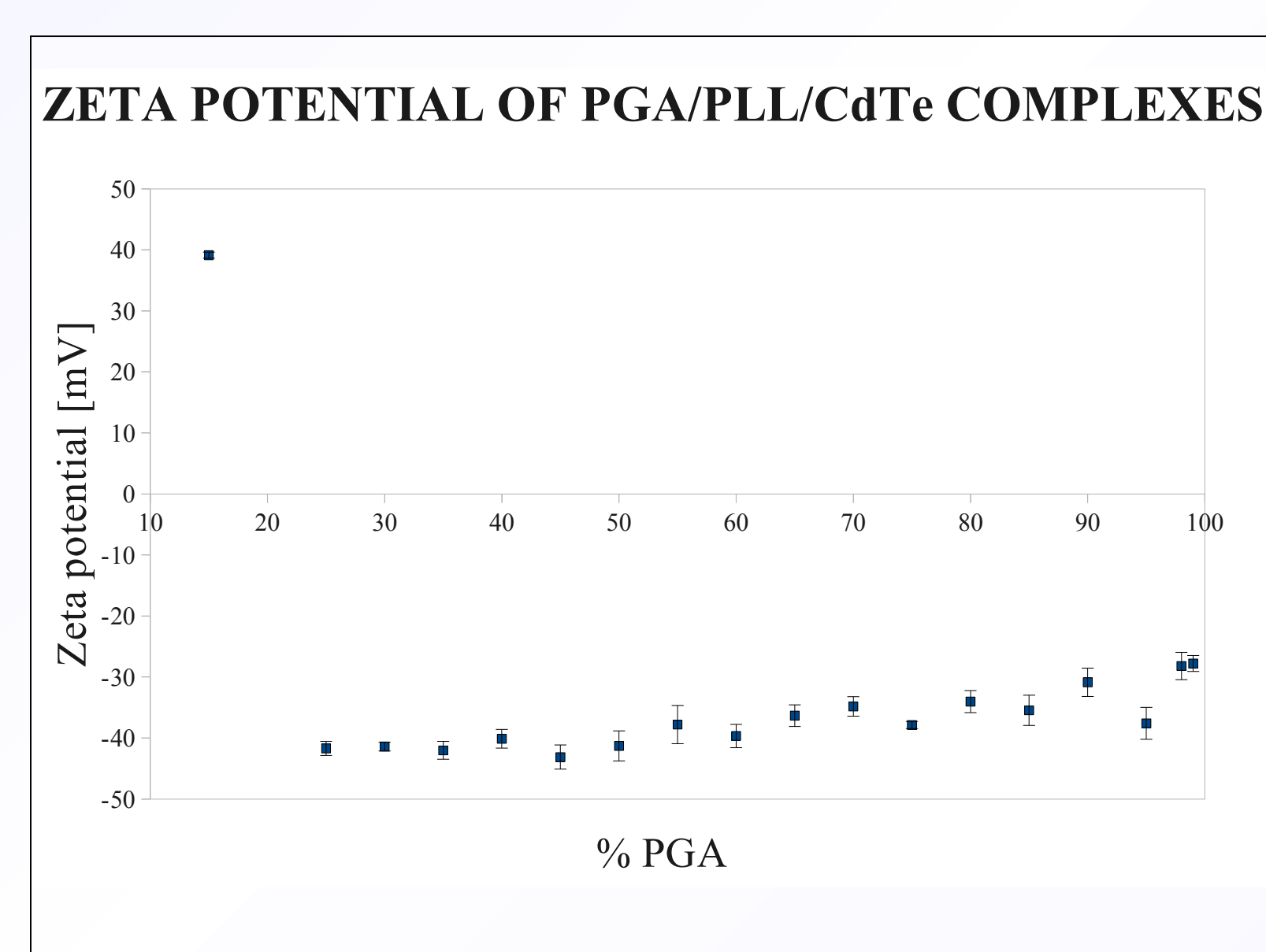
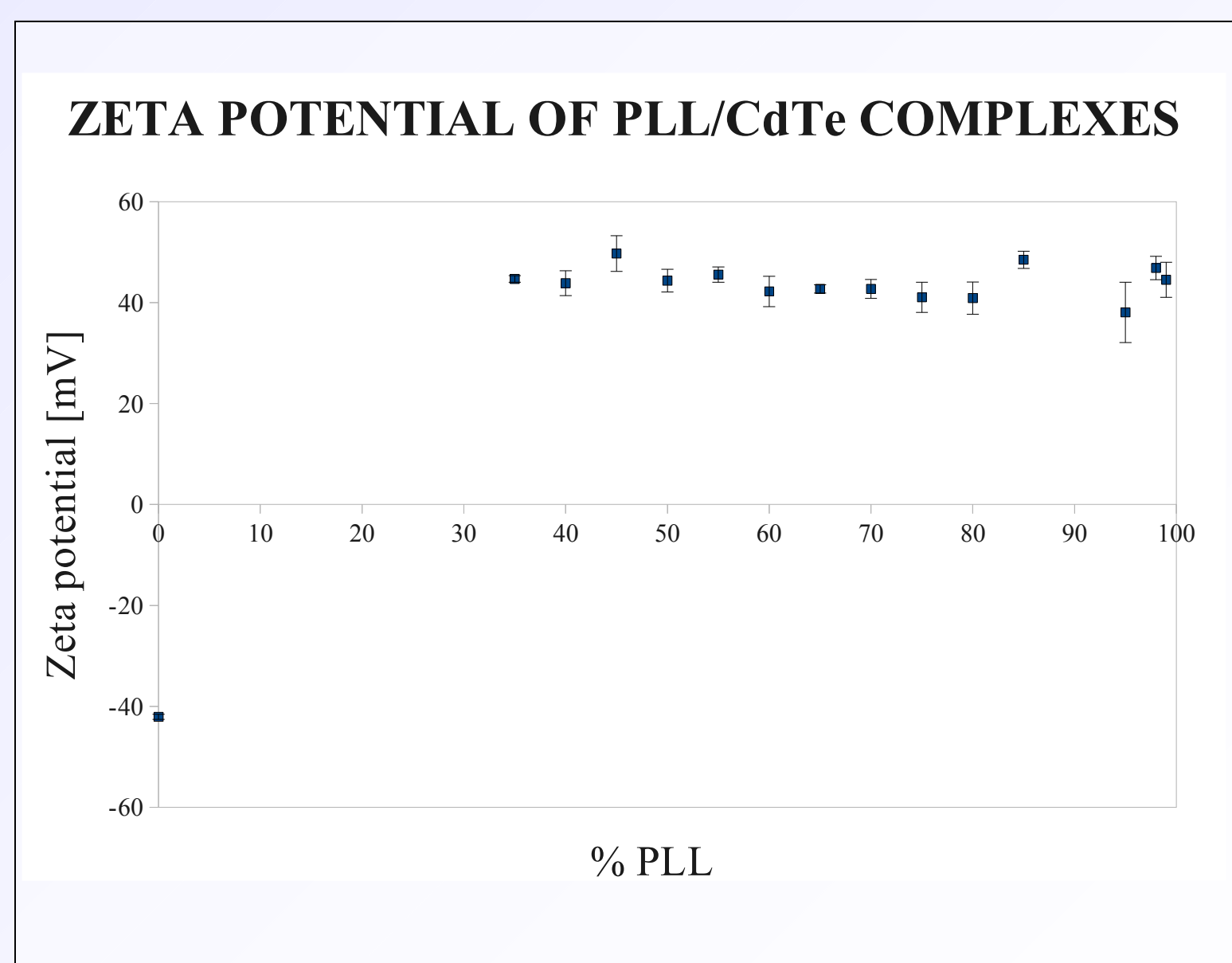
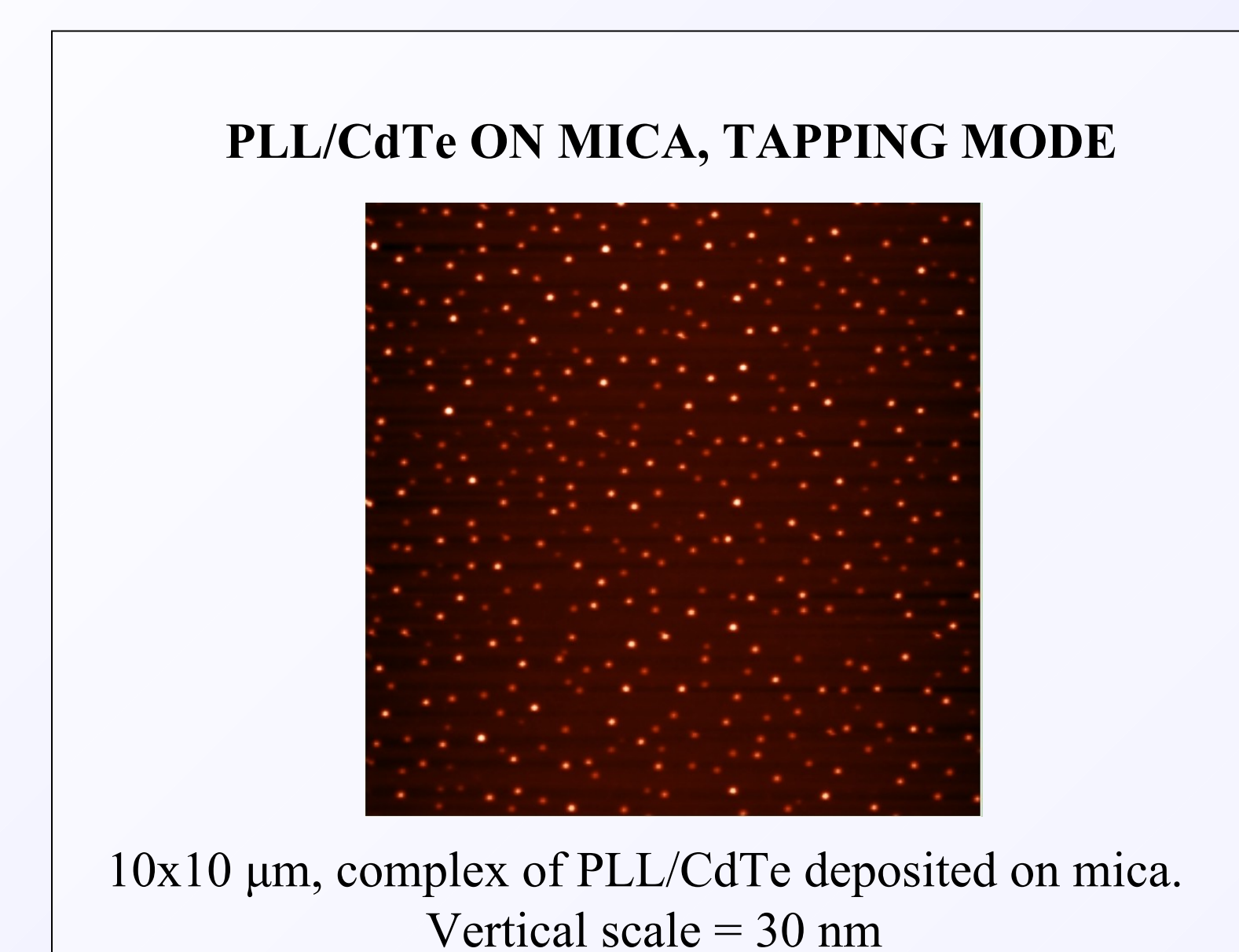
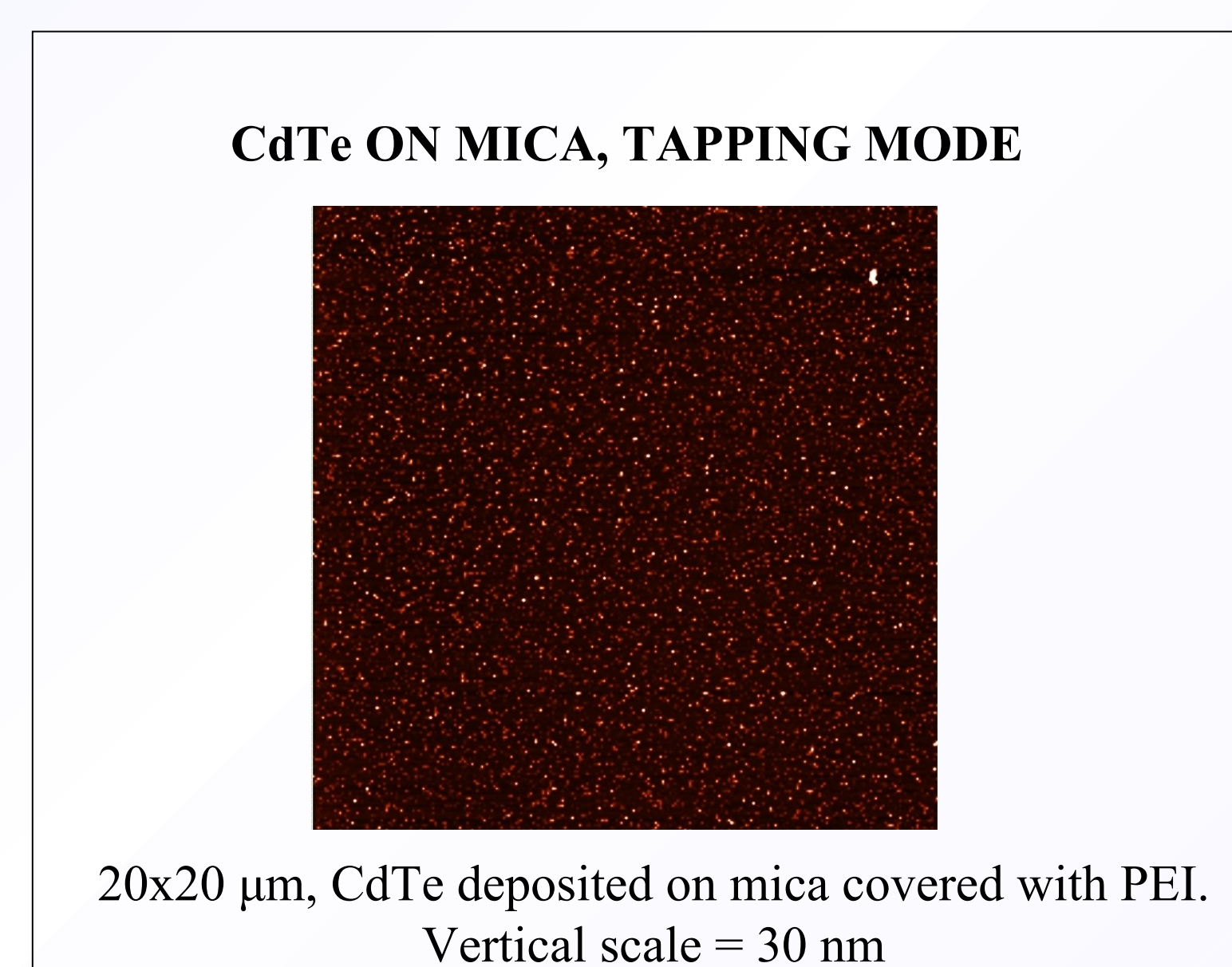


RESULTS

Dynamic Light Scattering



Atomic Force Microscope

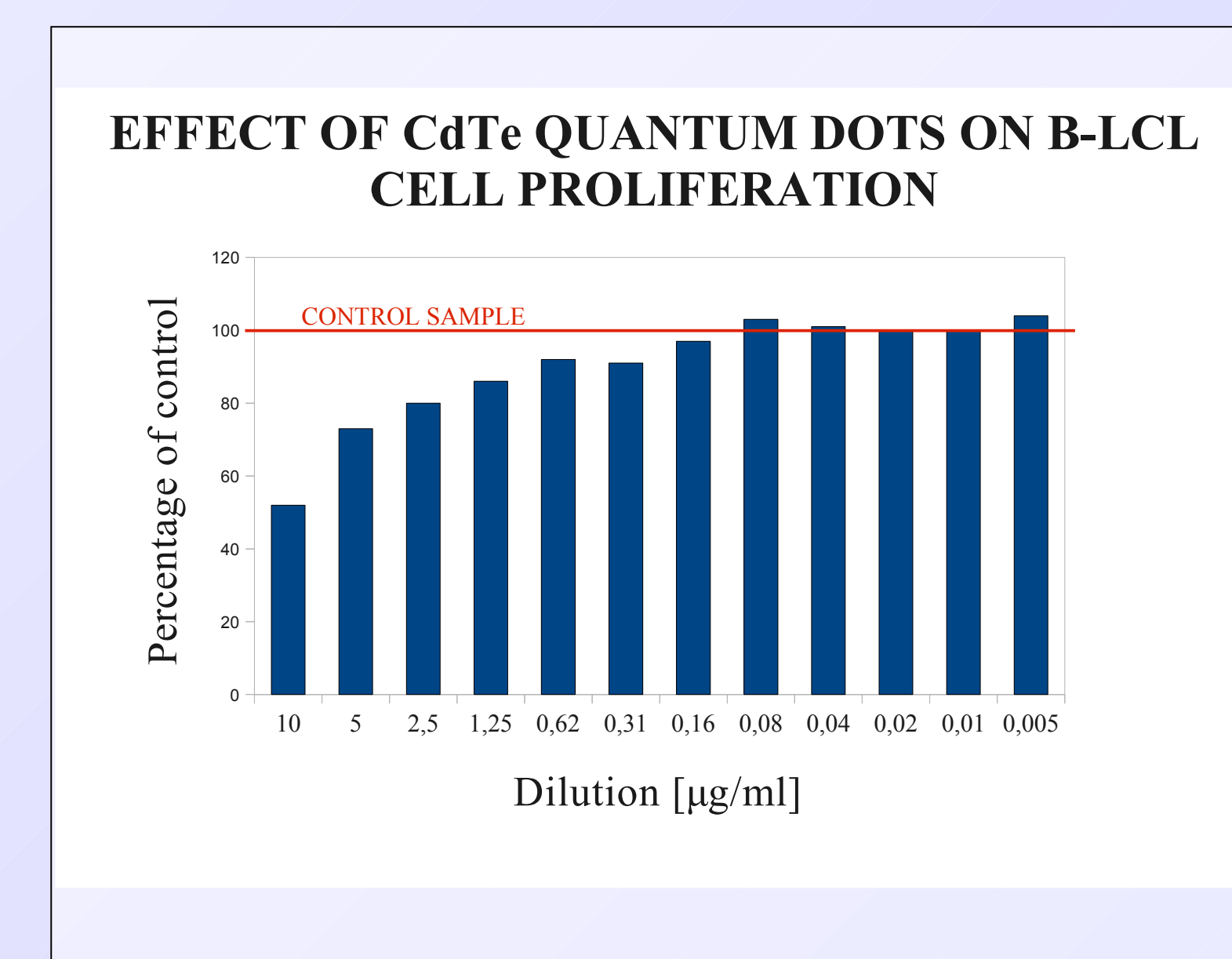
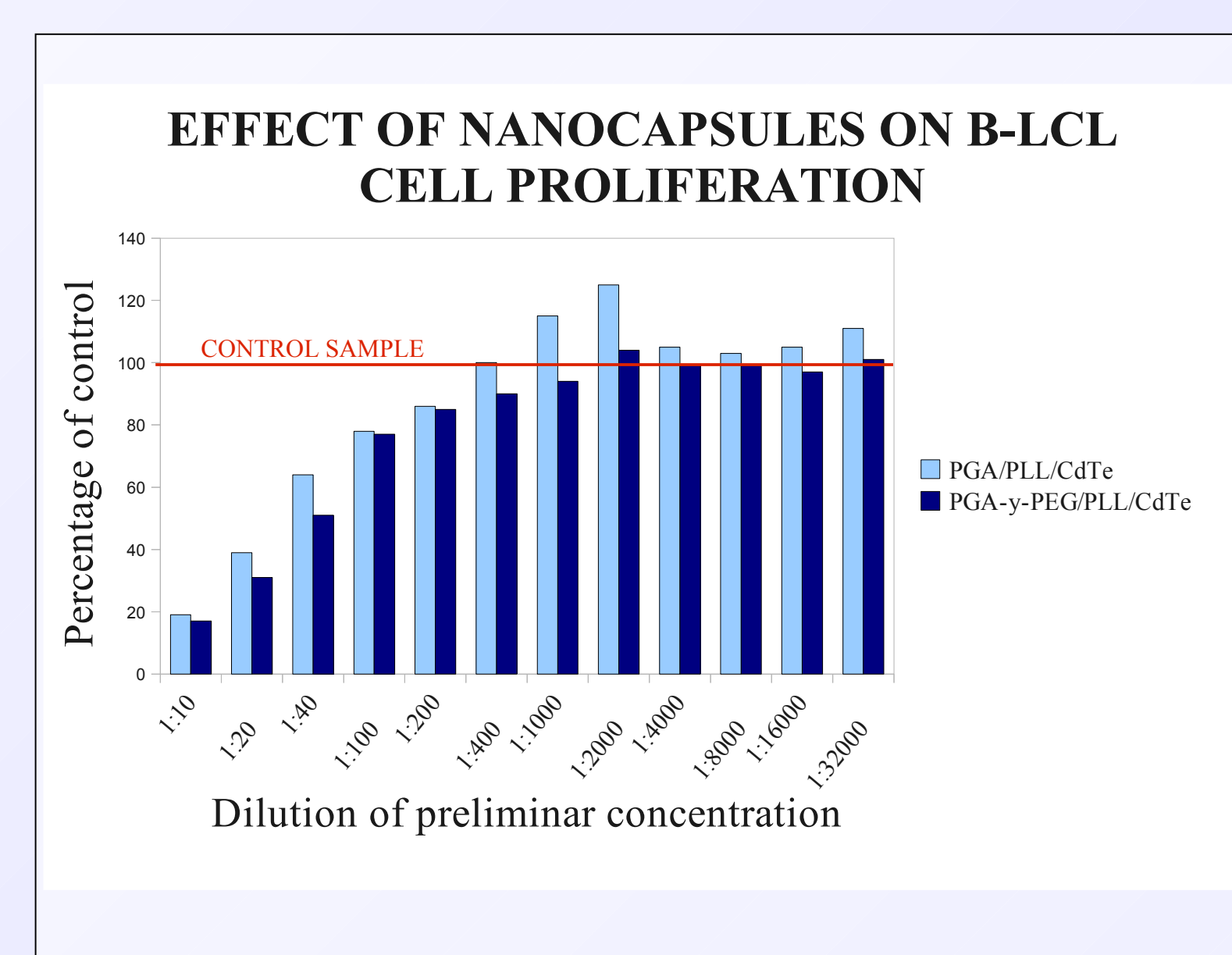


IN VITRO STUDIES

CdTe nanoparticles, plain capsules (PGA/PLL, PGA-y-PEG/PLL,) and CdTe-labeled capsules (PGA/PLL/CdTe, PGA-y-PEG/PLL/CdTe) were examined on flow cytometer in respect of their influence on B-lymphoblastoid (B-LCL) cell line proliferation. Control sample was incubated only with cell culture medium and antibiotics.



COMPLEX	RATIO	ZETA POTENTIAL [mV]	SIZE [nm]
PAH/CdTe	15:85	54	18
PSS/PAH/CdTe	60:6:34	-50	55
PLL/CdTe	35:65	44	19
PGA/PLL/CdTe	25:26:49	-41	76
PGA-y-PEG/PLL/CdTe	30:25:45	-5	50



CONCLUSIONS

- Successful production of different polyelectrolyte – quantum dots fluorescent complexes of sizes within range 20 – 75 nm
- Plain capsules do not affect B-LCL cells proliferation, thus they are biocompatible at all concentrations tested
- QDs stop affecting the proliferation of B-LCL cells at a concentration of 0.08 μg/ml
- PGA/PLL capsules labelled with QDs stop affecting the B-LCL cell proliferation at a dilution of 1:400, which corresponds with 0.25 μg/ml CdTe concentration

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