



Modification of Mesoporous Silica Particles with Poly(N-vinylcaprolactam-b-ethylene oxide)

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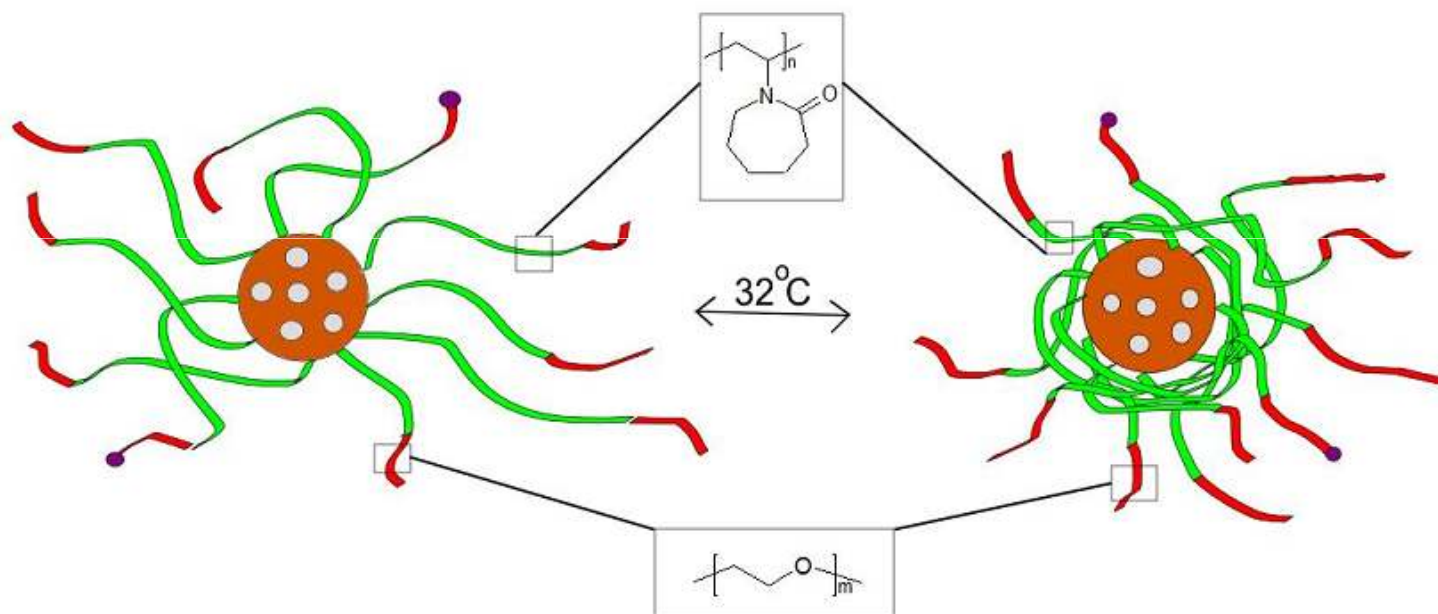


Introduction

- The aim of this work is to modify mesoporous silica particles with poly(N-vinylcaprolactam-b-ethylene oxide), PVCL-b-PEO
- These particles can be utilised as thermoresponsive vehicles for low molar mass active substances
- PVCL-b-PEO block copolymer is ideal candidate for biomedical application because of the low cytotoxicity



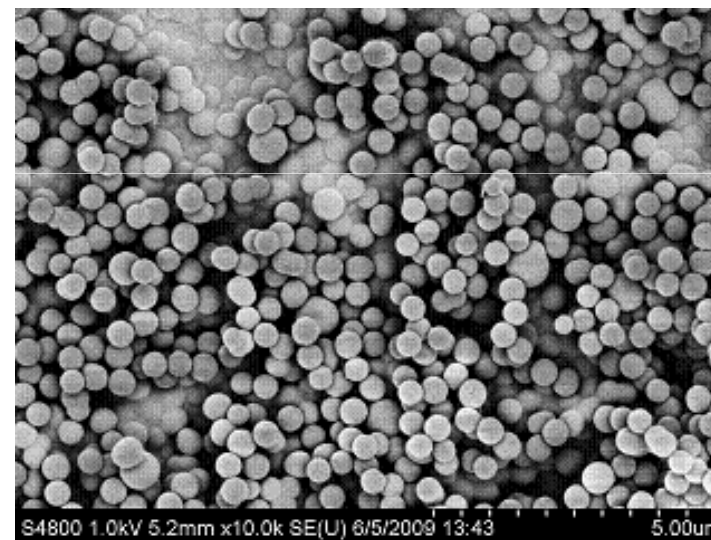
Aim





Mesoporous Silica Particles

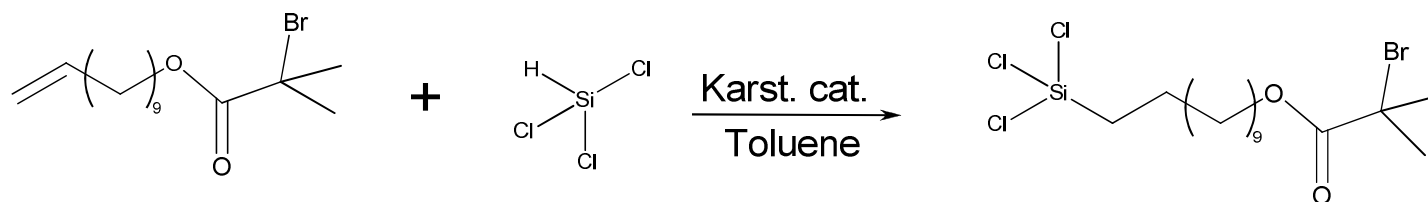
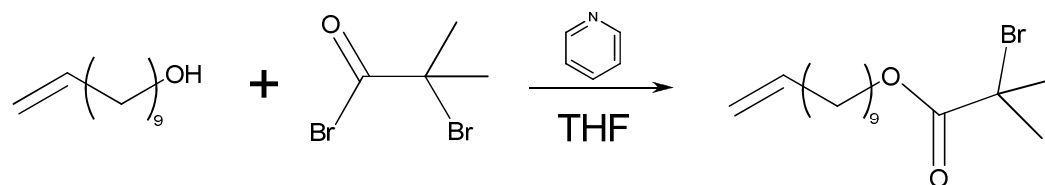
- Size 300nm
- Pore diameter 3-4 nm
- Surface area 700 m²/g
- Pores are protected by surfactant





Syntheses

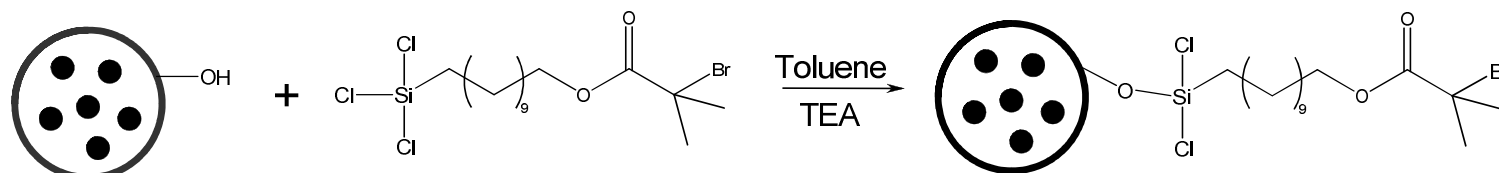
■ Synthesis of ATRP initiator



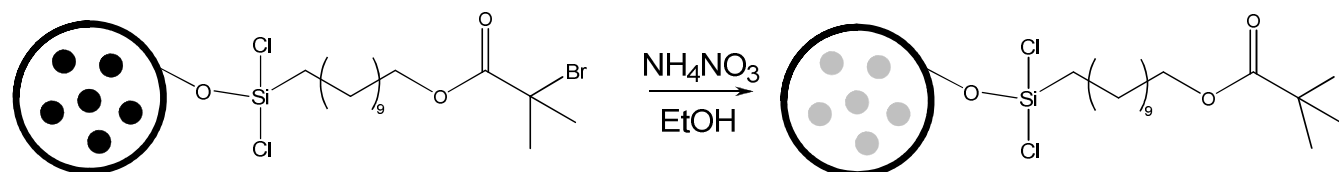


Syntheses

- Addition of initiator on the mesoporous silica particles



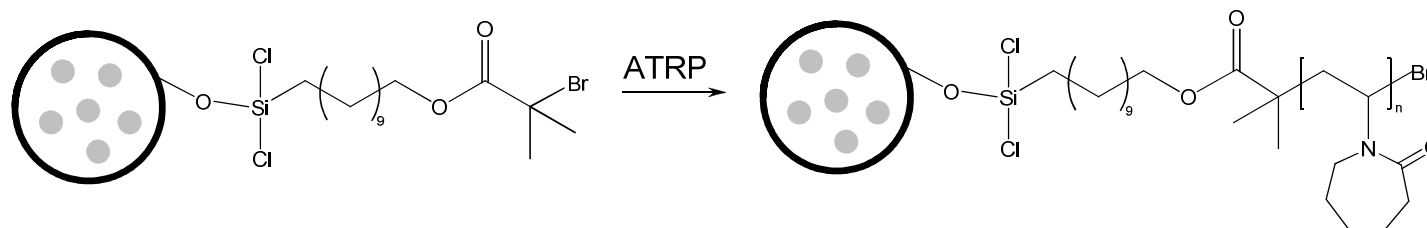
- Removal of Surfactant



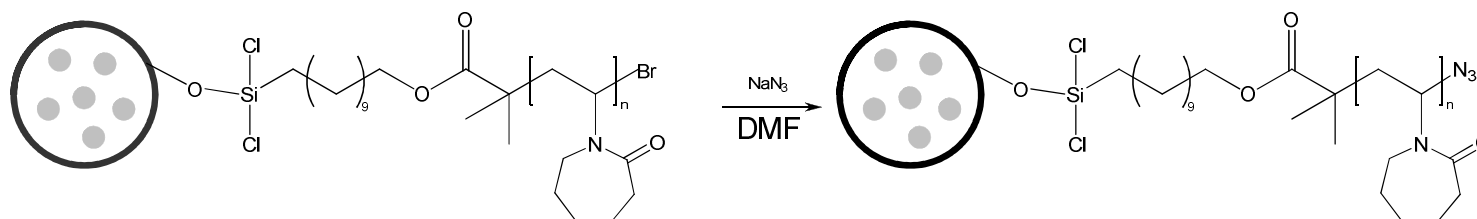


Syntheses

■ Polymerisation of N-vinylcaprolactam



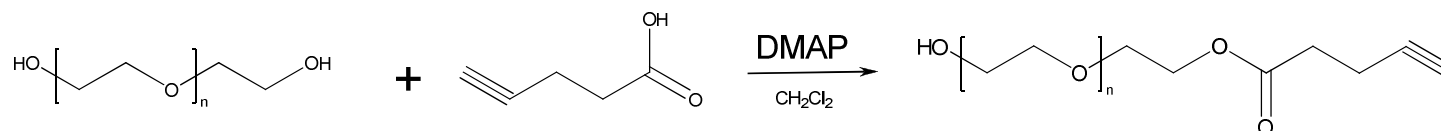
■ Azide functionality





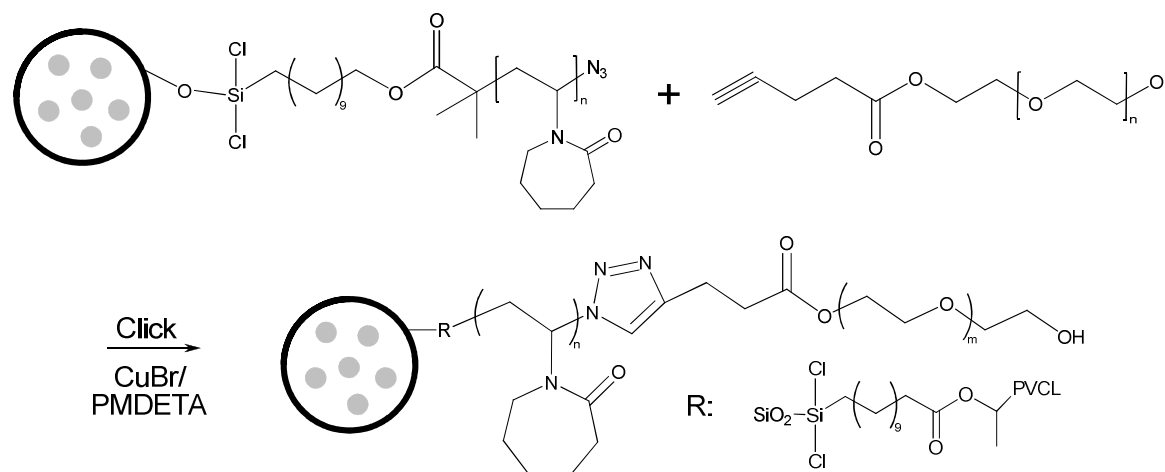
Syntheses

■ Synthesis of PEO-alkyne ($M_w=2000$ g/mol)



DMAP =
dimethylaminopyridine

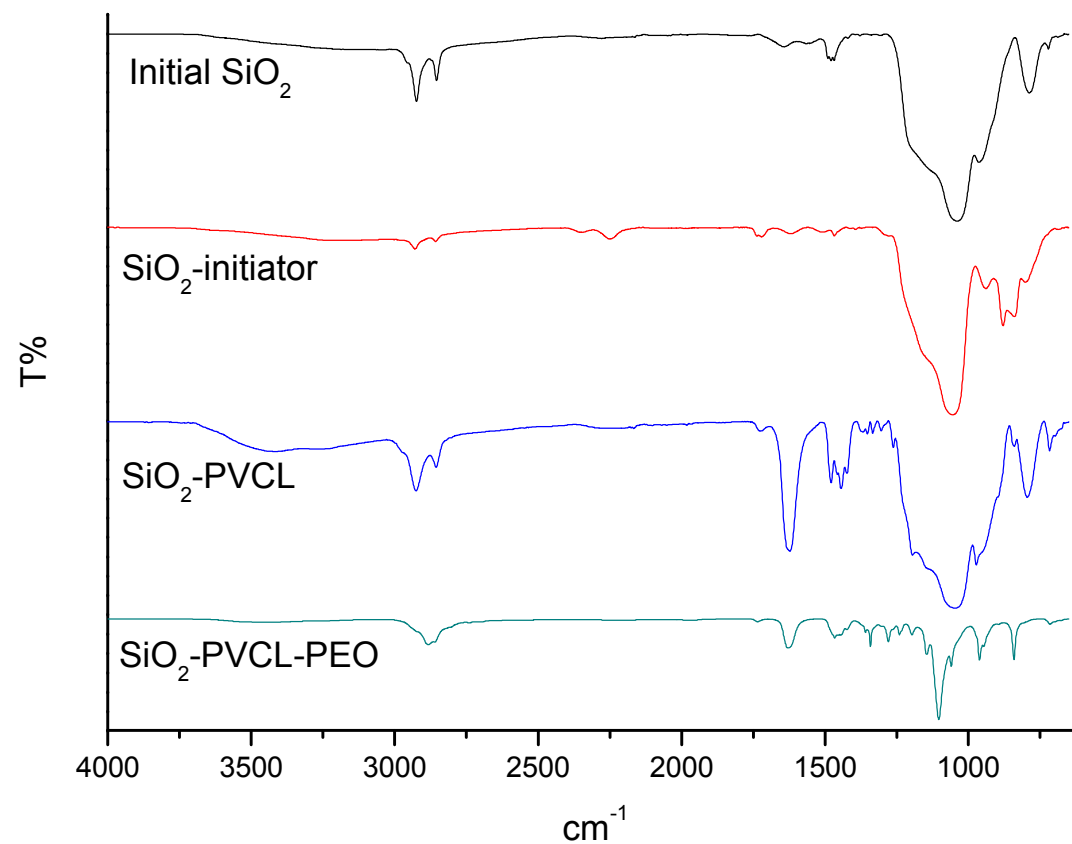
■ Synthesis of SiO₂-PVCL-PEO particles



PMDETA =
N,N,N,N,N-penta-
methyldiethylene-
triamine

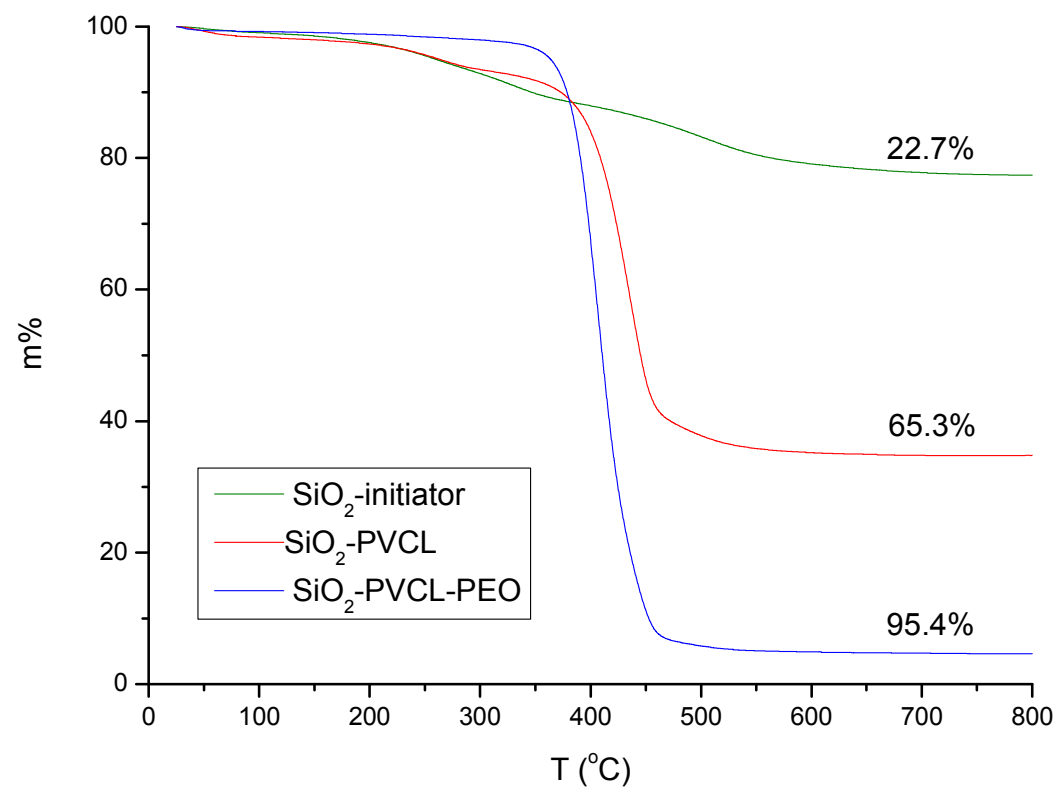


FTIR



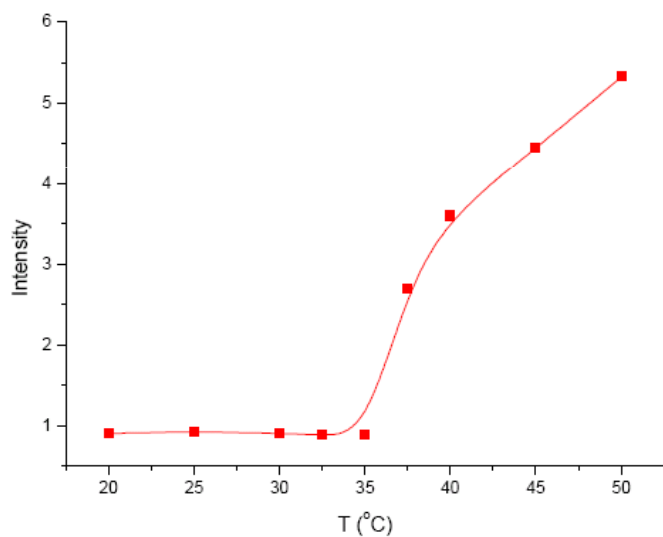


Characterisation: TGA

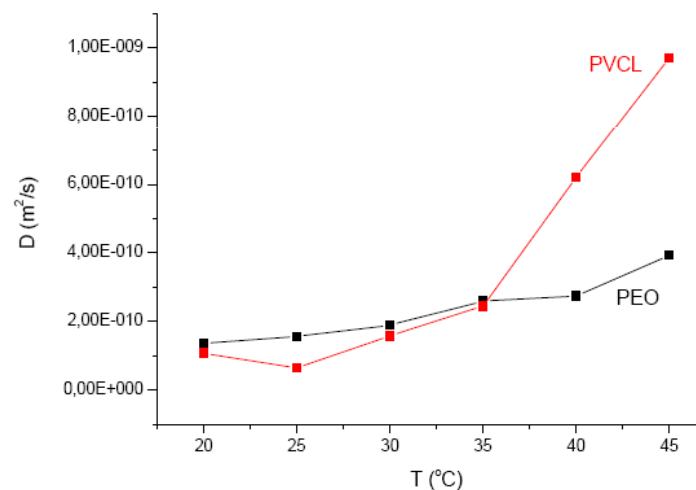




Thermoresponsive Properties



Dynamic light scattering of SiO₂-PVCL-b-PEO



Diffusion of PVCL and PEO blocks by ¹H-NMR



Conclusions

- Modification of mesoporous silica particles was successfully done via surface initiated ATRP polymerisation and "click"-reaction
- The thermoresponsive properties were studied with dynamic light scattering and NMR
 - PVCL-block showed cloud point at 35°C
- Loading of activates to modified silica particles will be studied (together with ÅA, Laboratory of Physical Chemistry)