



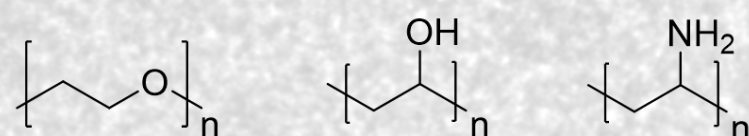
Influence of hydro-soluble polymeric stabilizers in nano-catalysis: molecular weight effect

S. Scurti*, S. Bianchi, D. Caretti, N. Dimitratos

Industrial Chemistry "Toso Montanari" Department, University of Bologna, Viale Risorgimento 4, 40126 Bologna, Italy
e-mail: stefano.scurti2@unibo.it

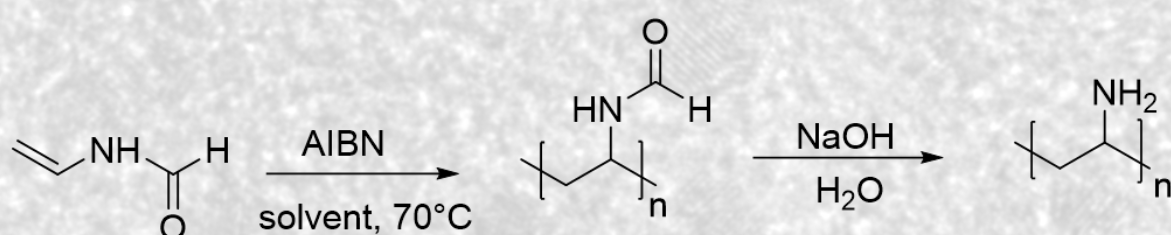
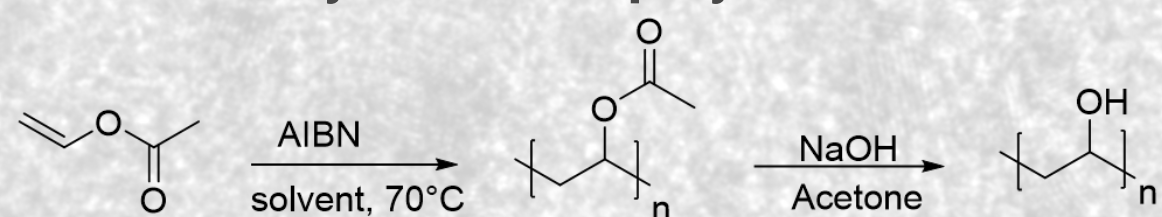
In the last years several studies have evidenced how the polymeric stabilizers used to control the nanoparticles aggregation can influence their catalytic activity in terms of conversion, selectivity and availability of active sites. [1-2] Recent works have proposed an innovative role of polymeric ligands in nano-catalysis by the synthesis of customized polymers in order to modulate and control the morphology and therefore the activity of metal nanoparticles. [2-3]

In this work we have investigated the molecular weight effect of three different hydro-soluble polymers, on the size and catalytic performance of supported gold nano-catalysts obtained by sol-immobilization method. The reduction of 4-nitrophenol with NaBH₄ has been chosen to investigate the catalytic activity of synthesized Au/AC catalysts.



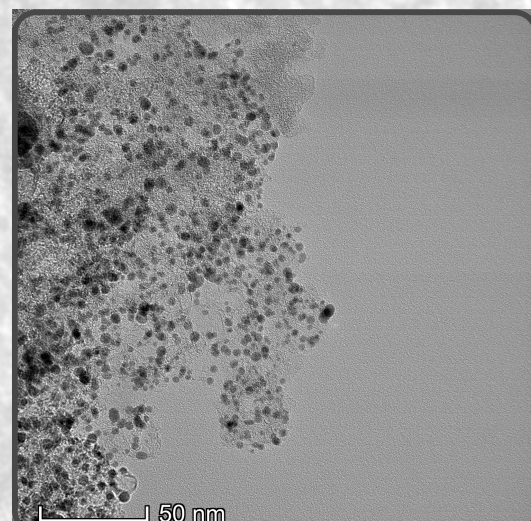
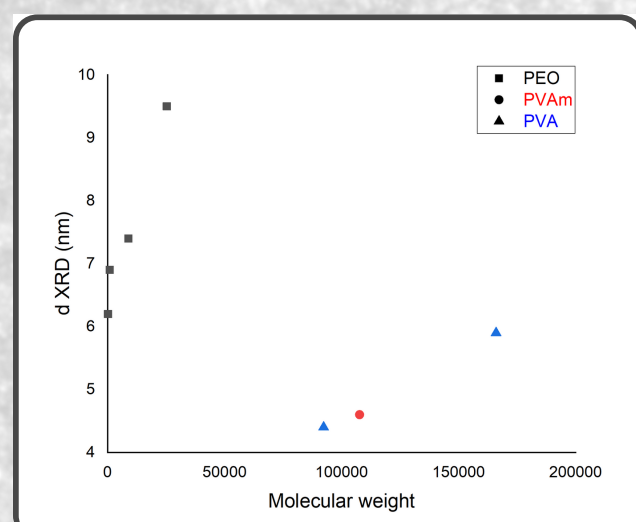
Polymeric stabilizers used: PEG; PVA; PVAm

Synthesis of polymers

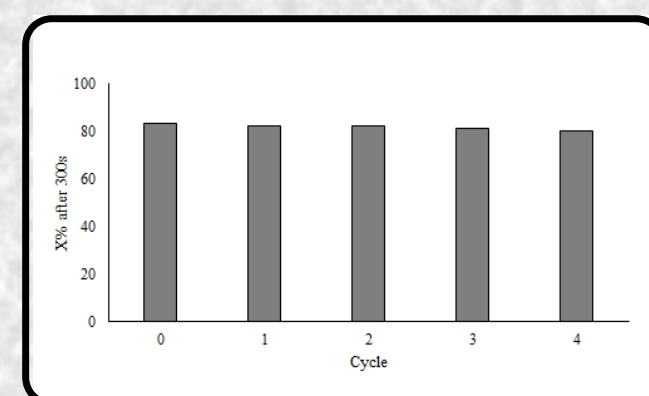
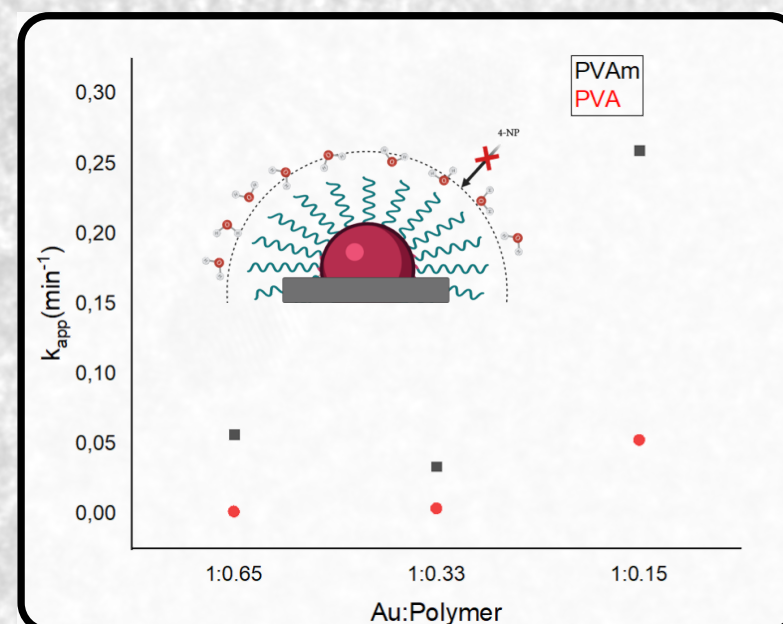
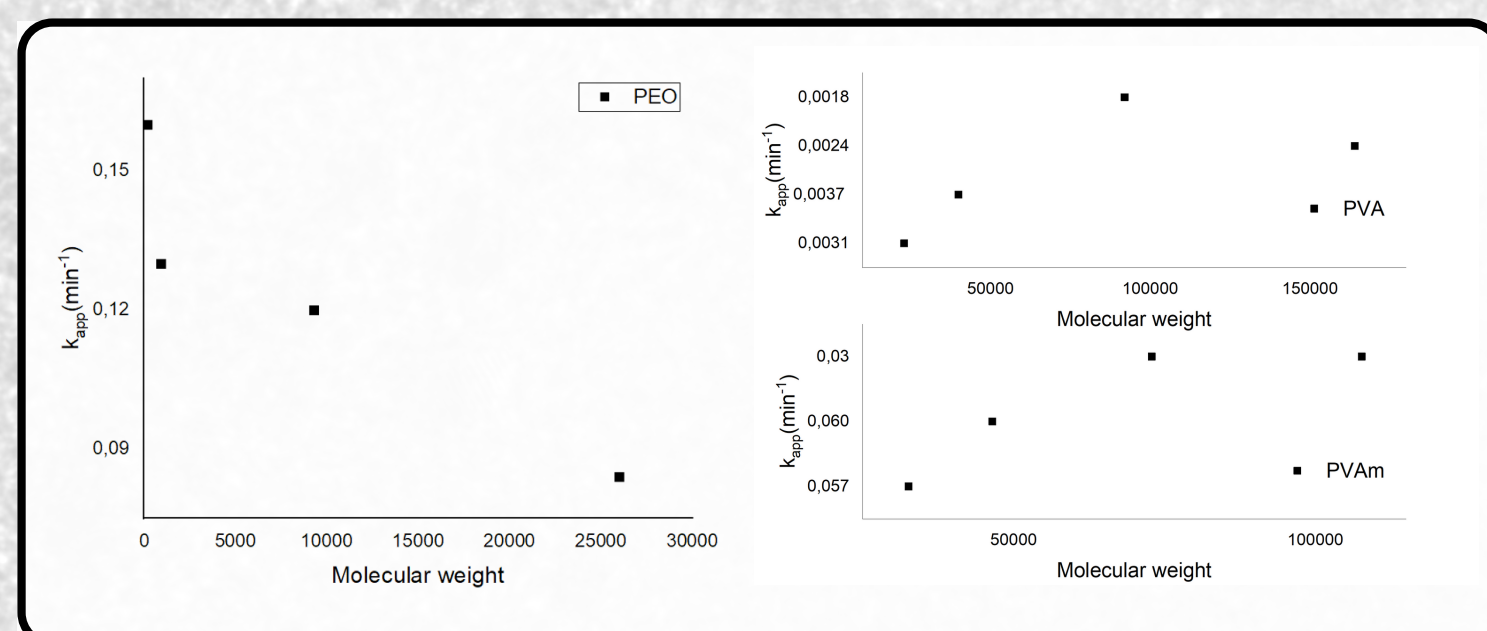
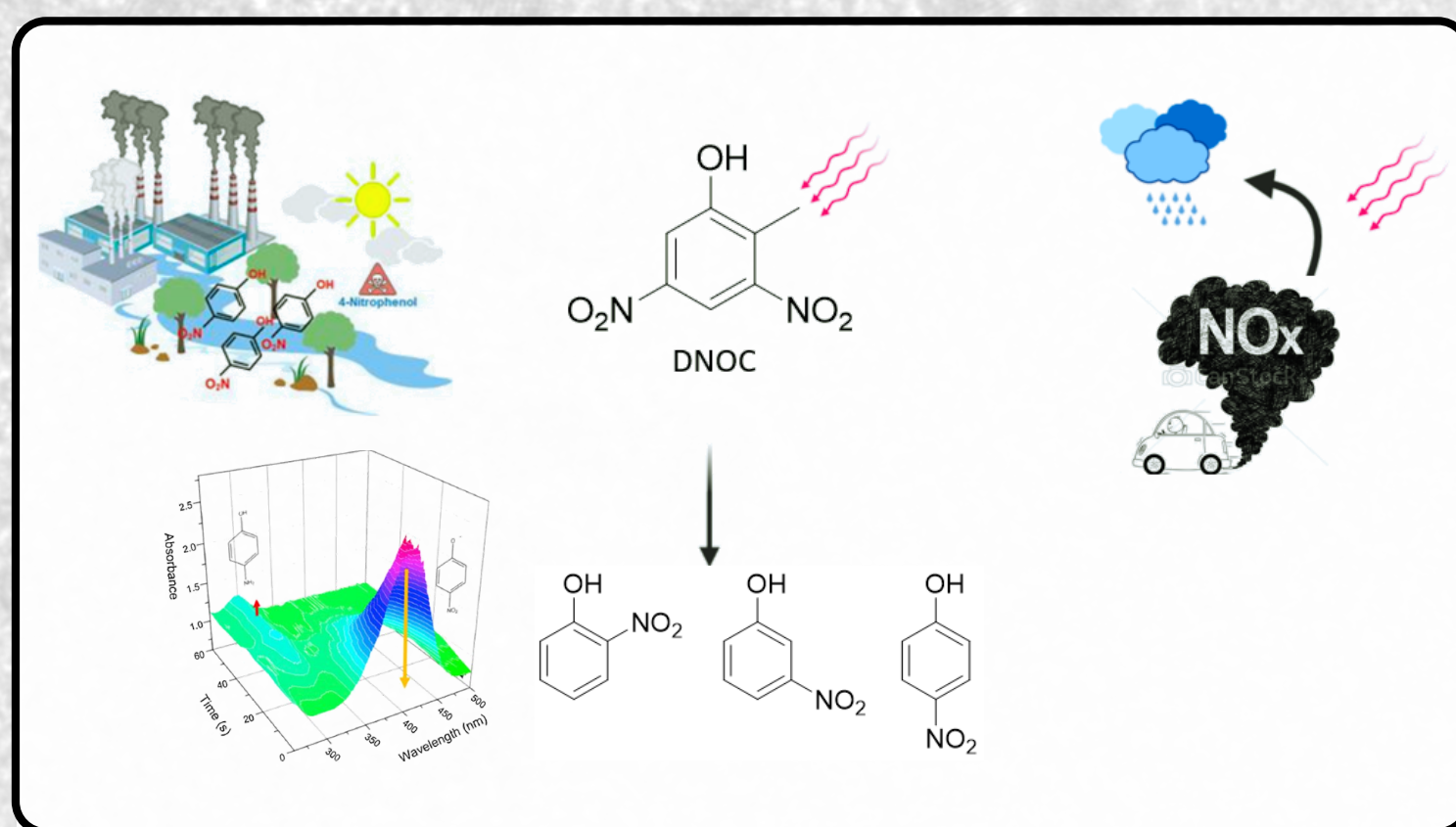


*PEG used were commercially available

Synthesis of gold nano-catalysts



Nitrophenols reduction



Several characterization techniques have been used to characterise unsupported and supported preformed Au colloidal nanoparticles. The catalytic activity observed has been explained based on structure-activity correlations. The molecular weight of stabilizers used in nano-structured materials synthesis can be considered a significant parameter for controlling catalytic activity and catalyst stability and can be offered as a "toolbox" for designing highly effective and stable catalysts.

References:

- [1] Jin, L et al Catalysts 7 (2017) 44
- [2] Bolisetty S. et al. Chem. Soc. Rev. 48 (2019) 463
- [3] Scurti S., et al Nanomaterials 11.4 (2021) 879

