

## Effect of non-ionic surfactant (EO)<sub>n</sub> chain size on poly(styrene-co-butyl- acrylate-co-acrylic acid) latex properties

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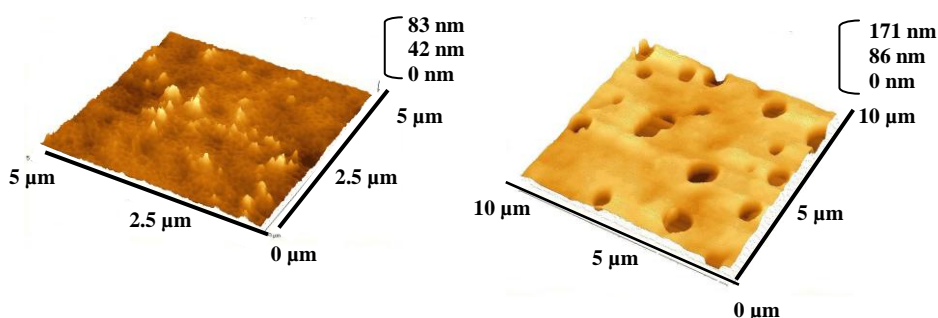
**Abstract** – Three styrene-acrylic latexes were synthesized and stabilized using non-ionic surfactants. Zeta potentials are similar, -30, -31 and -29 mV, but particle sizes range from 102 to 206 nm. Even though chemical composition is similar for the three latexes, their adhesion to glass show significant differences and one of them displays excellent adhesion.

Latexes are colloidal polymers and they show a very broad range of properties for the same overall composition, depending on details of the synthesis protocol. The thermodynamically unstable lattices are kinetically stabilized using surfactants to lower the interfacial tension, which allows the emulsification of monomers and the formation of durable dispersions. Three lattices were prepared using a semi-continuous procedure in which monomers were continuously added to an initial start-up load. Non-ionic surfactants with different ethoxylated chains were used to stabilize latex particles [1-3]. The films of the latexes prepared with ethoxylated nonylphenol NP(EO)<sub>40</sub> show smooth, homogeneous surface where particles are still discerned. However, films of the latex polymerized using NP(EO)<sub>100</sub> cast on glass show a rougher and heterogeneous surface with holes that are enlarged upon aging. Latexes show similar values of zeta potential but different effective diameters and adhesion to glass also changes significantly, as shown in Table 1. IR spectra are similar for all latexes but for a clear difference in the 1106.9 cm<sup>-1</sup> region.

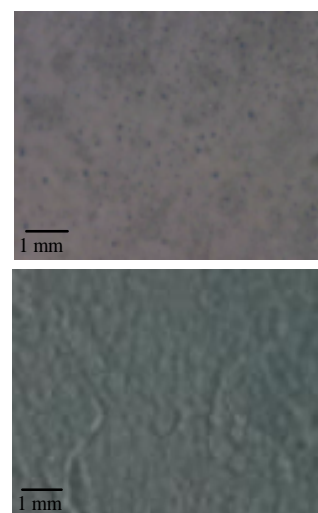
**Table 1:** Properties of the latexes prepared using non-ionic surfactants: particle size, zeta potential, effective diameter and film dry adhesion.

Latex Code and surfactant used	Zeta potential (mV)	Effective diameter (nm)	Dry adhesion ASTM
LR40 / NP(EO) <sub>40</sub>	-30	102	5B
SR1 / NP(EO) <sub>100</sub> (1)	-31	206	1B
SR01 / NP(EO) <sub>100</sub>	-29	195	1B

(1) More 28 % of water was added along the reaction



**Figure 1:** AFM non-contact images of latex prepared with NP(EO)<sub>40</sub> (left) and NP(EO)<sub>100</sub> (right).



**Figure 2:** Optical micrograph of latex film cast on glass prepared with NP(EO)<sub>40</sub> (up) and NP(EO)<sub>100</sub> (down).

### References

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