

## Accepted Manuscript

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PII: S0014-3057(17)31049-2

DOI: <http://dx.doi.org/10.1016/j.eurpolymj.2017.09.013>

Reference: EPJ 8062

To appear in: *European Polymer Journal*

Received Date: 13 June 2017

Revised Date: 3 August 2017

Accepted Date: 8 September 2017

Please cite this article as: Ustoglu, C., Cagli, E., Erel-Goktepe, I., Layer-by-layer films of block copolymer micelles with cores exhibiting upper critical solution temperature behaviour, *European Polymer Journal* (2017), doi: <http://dx.doi.org/10.1016/j.eurpolymj.2017.09.013>

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# Layer-by-layer films of block copolymer micelles with cores exhibiting upper critical solution temperature behaviour

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## Abstract

We report on preparation of block copolymer micelles with cores exhibiting upper critical solution temperature (UCST) behavior in the range of 40-45°C at pH 7.5 and incorporation of such micelles into layer-by-layer (LbL) films to obtain UCST-type multilayer films. Pyridine units of poly(2-vinylpyridine-*b*-ethylene oxide) (P2VP-*b*-PEO) were partially quaternized and its self-assembly into micellar aggregates was achieved in the presence of potassium hexacyanoferrate ( $K_3Fe(CN)_6$ ) at pH 7.5 at either 25°C or 37.5°C. The cores of the resulting (QP2VP+[Fe(CN) $_6$ ] $^{3-}$ )-*b*-PEO micelles exhibited UCST-type behavior at pH 7.5 and the critical temperature varied in the range of 40-45°C depending on the micellization temperature and amount of  $K_3Fe(CN)_6$ . Our results showed that micellization temperature and  $K_3Fe(CN)_6$  concentration were highly critical on the UCST of the micellar cores. In case of (QP2VP+[Fe(CN) $_6$ ] $^{3-}$ )-*b*-PEO micelles prepared at 25°C, increasing  $K_3Fe(CN)_6$  concentration during micellization suppressed UCST behavior within a temperature range of 25-50°C. In

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## Abbreviations

upper critical solution temperature (UCST)

layer-by-layer (LbL)

poly(2-vinylpyridine-*b*-ethylene oxide) (P2VP-*b*-PEO)

poly(N-methyl-2-vinylpyridiniumiodide-*block*-ethyleneoxide) (QP2VP-*b*-PEO)

Tannic Acid (TA)

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