

# “Nanochemistry and biotechnology”

## Micellar carriers for anticancer drug eumelanin

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In the present work, a detail study of chemical structure, solubility, electrochemical and spectral properties of the anticancer drug eumelanin (the product of vital activity of black yeast “*Nadsoniella nigra sp. X-1*”) as well as its encapsulation by micellar nanocarriers based on (methoxy)poly(ethylene oxide)/poly(acrylic acid) block copolymers was carried out using <sup>1</sup>H NMR, FTIR and UV-Vis spectroscopy, potentiometric titration, static light scattering, and TEM. The zwitter-ionic character of eumelanin (EM) macromolecules was established due to a presence the charged >NH<sub>2</sub><sup>+</sup> and -COO<sup>-</sup> groups in a solid EM sample. Polyampholyte properties of EM and its slowly dissolution only at pH~11 were disclosed by potentiometric titration. A complex balance of electrostatic interactions and hydrogen bonds was shown to determine the state of EM in aqueous medium. A wide spectrum of morphological forms of the micellar carriers could be produced by variation of the absolute and relative length of both the blocks. Encapsulation of the drug into micellar nanocarriers (Fig. 1 **a**, **b**) ensured its solubility at pH≤6. The process of EM encapsulation by the nanocarriers with different morphology was studied and discussed.

Fig. 1. TEM images for: **(a)** free PAAc-*b*-PEO-*b*-PAAc triblock copolymer micelles and **(b)** those with connected eumelanin.

C<sub>TBC</sub>=0.5 kg·m<sup>-3</sup>.

