

**SOLUBILIZATION OF EUMELANIN BY
INTERMOLECULAR COMPLEX FORMATION WITH
BLOCK COPOLYMERS**

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The melanins are a broad class of functional macromolecules found throughout in nature. In skin, melanin appears in two forms: eumelanin and pheomelanin. Biosynthetically, eumelanins arise within organelles termed melanosomes by tyrosinase-catalyzed oxidation of tyrosine via oxidative polymerization of 5,6-dihydroxyindole (DHI), 5,6-dihydroxyindole-2-carboxylic acid (DHICA) and other biosynthetic intermediates [1]. The eumelanin is now generally accepted to be a highly heterogeneous macromolecule based on DHI and DHICA units and their oxidized states coupled in oligo- and polymeric structures.

The current work presents a detailed study of chemical structure, solubility, quantity of ionic groups and electrochemical behavior of the melanin sample, which is the vital activity product of black yeast "*Nadsoniella nigra sp. X-1*". It is revealed a zwitter-ionic character of its macromolecules due to a presence in a solid melanin sample charged amine ($>\text{NH}_2^+$) and carboxylic ($-\text{COO}^-$) groups. Polyampholyte properties of melanin macromolecules were clearly displayed at the potentiometric titration of its sample, which was slowly dissolved at pH~11. It was shown that the state and solubility of melanin in aqueous medium is determined by complex balance of electrostatic interactions and hydrogen bonds. A strong compactization of melanin macromolecules resulted in the appearance of insoluble fraction in aqueous medium was observed in the acidic region of the solution pH. The solubility of eumelanin at pH<6 by intermolecular complex formation (InterPC) with macromolecules or micelles of double-hydrophilic block copolymers based on methoxypoly(ethylene oxide) and poly(acrylic acid) or poly(ethylene oxide) and polyacrylamide was revealed.

1. *A Huijser, A. Pezzellab, V. Sundström*. Functionality of epidermal melanin pigments: current knowledge on UV-dissipative mechanisms and research

perspectives // Phys. Chem. Chem. Phys.–2011.–**13**.–P. 9119–9127.