

The effect of cysteine on the synthesis of melanins

The research is part of ongoing studies on the synthesis of melanins and the parameters that affect their physic-chemical properties, particularly their color. Melanins can be generated from a wide variety of precursors but in human physiology melanins are mainly made from L-DOPA (skin and hair pigmentation) or dopamine (neuromelanin in the brain) as the precursor. Skin or hair pigmentation is typically divided into eumelanin (brown to black) and pheomelanin (yellow to red). The “standard model” describing melanin synthesis states that eumelanin is synthesized from L-DOPA, while pheomelanin is synthesized through a combination of L-DOPA and cysteine. Building upon ongoing experiments the effect of cysteine on the synthesis of melanins using a variety of different precursors is studied. We consistently observed that the presence of cysteine generates much darker colored materials in stark contrast with the “standard model”. This major contradiction is explored using small-scale experiments to evaluate the effect of cysteine on the melanogenesis reaction and using large-scale experiments. In this latter set of experiments, melanins synthesized in the absence or presence of cysteine are generated, purified, and characterized using UV-Vis spectroscopy, liquid chromatography, fluorescence spectroscopy and infrared spectroscopy.