Stable aqueous solutions of keratin polypeptides: their properties in solution and at interfaces

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Abstract

Keratins are important structural fibrous proteins and are the main constituting components in skin, hair, wool, feathers, nails, horns and connecting tissues[1]. Their physical and biological studies have direct relevance to health and disease and also bear important implications to hair and skin care. In addition to personal care, there are many other reasons that require us to understand how keratins behave physically and how they interact with other molecules. Wool is predominantly composed of keratin proteins that provide desirable properties such as strength, insolubility, and moisture regaining and retaining. The purpose of this work is to develop water-soluble keratin polypeptides from sheep wool, which can be used to form smooth molecular layers and optically flat thin films. These model biointerfaces can facilitate various physical and biological measurements that would otherwise be too difficult to contemplate. Successful preparation of keratin samples was demonstrated by identification of molecular weights of the key components from gel electrophoresis and measurements of their surface tension and basic solution properties. Zeta potential measurements from keratin samples prepared demonstrated almost identical pH dependent surface charge distributions with isoelectric points around pH 3.5, showing that during purification by dialysis has completed removal of SDS used during wool fibre dissolution.

Further studies from keratin adsorption onto solid surfaces by spectroscopic ellipsometry and neutron reflection have-established the nature of the spin coated films.

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1. Yamauchi, K.; Yamauchi, A.; Kusunoki, T.; Kohda, A.; Konishi, Y., Journal of Biomedical Materials Research 1996, 31, 439-444.