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Differential Adhesion of Amino Acids to Inorganic Surfaces

ROBERT WILLETT, KEN WEST, LOREN PFEIFFER, Bell Laboratories, Lucent Technologies — Interactions at the interface of biological molecules and inorganic materials are an open question in materials science; understanding these hybrid interfaces at the molecular level can have extensive basic and practical implications. In an extensive set of measurements we have systematically examined the adhesion of amino acids to a series of inorganic surfaces used in semiconductor devices. Peptides comprised of each of the twenty amino acids were exposed in solution to surfaces including metals, insulators, and semiconductors. Significant differential adhesion to the various surfaces is observed over the complement of amino acids, with adhesion determined largely by the amino acid side-chain charge. Mapping of adhesion findings for the amino acids versus materials in multiple solutions has been accomplished, in addition to examination of concentration and pH dependence. These results provide an empirical basis for building peptide to inorganic surface structures. In this vein, we have designed inorganic nano-structures that are shown to selectively bind to prescribed primary peptide sequences.

Robert Willett
Bell Laboratories, Lucent Technologies

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