The Development of a Generic Bioanalytical Matrix Using Polydiacetylenes**

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In order to develop more user-viable formats for polydiacetylene (PDA) biosensors, it is necessary to control the biochemical and physical properties of the PDA matrix. In this study, we prepare polydiacetylene liposomes from controlled mixtures of 10,12-pentacosadiynoic acid (PCDA) and PCDA–MI, a PCDA derivative with a maleimide headgroup. Both the chemical and physical properties of the liposome are easily manipulated by controlling the molar ratio of PCDA to PCDA–MI during liposome preparation. After preparing the liposomes, the activity of the maleimide headgroups increases linearly with the PCDA–MI content for concentrations in the range of 0–30 %. As a result, the antibody-binding characteristics of the PDA liposomes increase with PCDA–MI content. It is also possible to modulate the physical properties of the liposome. Differential scanning calorimetry measurements show that the phase organization of the liposome is progressively lost with increasing PCDA–MI content. Furthermore, the liposomes show an increased color change in response to temperature that is also dependent on PCDA–MI content, indicating increased membrane fluidity. When PCDA:PCDA–MI liposomes are conjugated with a cell-specific antibody the response to the antigen induces a color change that is dependent on the PCDA–MI content. Consequently, it is deduced that the increased sensitivity of the liposomes containing higher PCDA-MI content is due to increased antibody binding and membrane fluidity. From these experiments, we identify the factors controlling the colorimetric properties of the PDA matrix and demonstrate that it is possible to modulate the sensitivity and stability of PDA biosensors by controlling the ratio of constituent monomers.