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Supplementary Information

The Influence of Lead (II) Ions Introduced into the Subphase on the Stability of Mixed 'Polyamic Acid + Surfactant' Monolayers and Manufacturing of Dye-containing Langmuir – Blodgett Polymeric Films

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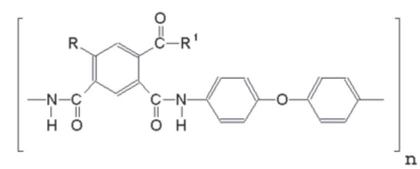
The conditions for the preparation of monolayers of polyamic acid (PA) with one COOH group per repeating unit on aqueous subphases are described. It is revealed that the presence of Pb^{2+} ions in the aqueous subphase favors keeping up the polymer on the water surface, while the monolayers are unstable on the pure aqueous subphase. The behavior of PA films on water/air interfaces is examined mainly at pH 5.8-6.0 and 1×10^{-5} mol L^{-1} lead nitrate. The influence of *n*-octadecyl alcohol and *n*-octadecylpyridinium bromide on the character of isotherms and stability of monolayers is studied. The limiting area per repeating unit, S_m, increases along with the increase of surfactant fraction in the initial (PA + *n*-octadecyl alcohol) and (PA + *n*-octadecylpyridinium bromide) mixtures. The S_m values, collapse pressures, and compressibilities of the films are tabulated. Basing on these polyamic monolayers, Langmuir – Blodgett (60-80)-monolayer films containing various dyes (a rhodamine dye, rose Bengal B, and quinaldine red) are fabricated by depositing on glass (quartz) support by Schaefer method. Absorption and emission spectra of these films are registered. The dye content was as a rule 6 to ≈30 mole %. Vis absorption spectra of plymeric (60-80) monolayer films containing rose Bengal B and quinaldine red, measured after soaking in aqueous buffer solution, appeared to be sensitive to the pH values of the latter. The 'apparent' value of quinaldine red in (PA + octadecyl alcohol) films, as determined by standard spectroscopic procedure, equals 2.3±0.3. Such pH response of polymeric multilayers can be used in sensors.

Polyamic acids, **1** and **2**, have the general formula given below



1 is (4,4'-diphenyloxide)-2-carboxyisophthalamide, with R = H, R^1=OH, and **2** is (4,4'-diphenyloxyde)-4,6-dicarboxyisophthalamide, with R=COOH, R^1=OH.

Some typical compression isotherms of **1** at 20.0 ± 0.05, stability curves, and S_m dependences vs. the number of surfactant molecules per repeating unit of **1** , *r*, are given below.

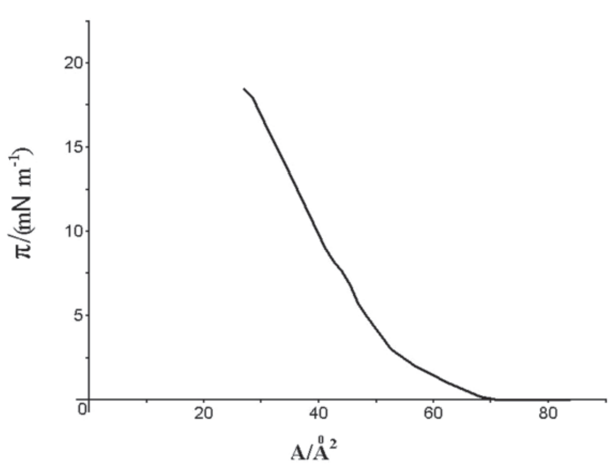


Figure 1S. $\pi - A$ isotherm of **1** on Pb^{2+}–containing subphase.

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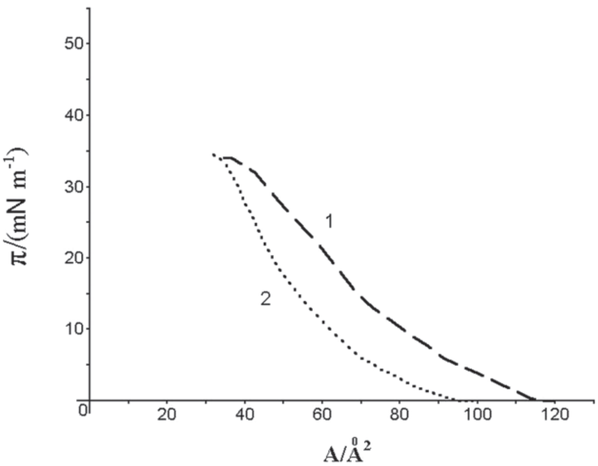

Figure 2S. π– *A* isotherms for (**1** + *n*-octadecylpyridinium bromide) mixtures on Pb^{2+} – containing subphases: *r* = 1 (1); *r* = 0.5 (2).

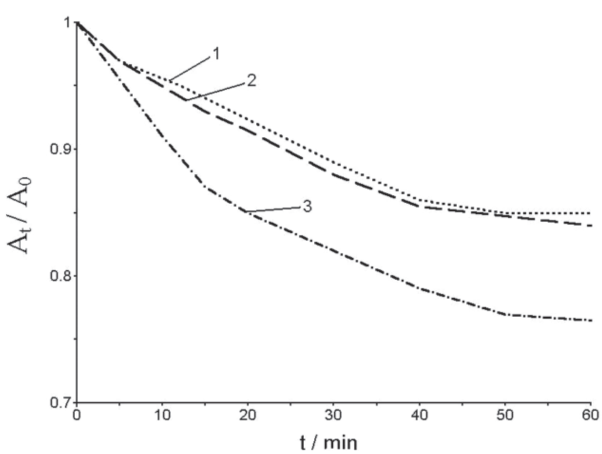

Figure 3S. Stability curves for (**1** + *n*-octadecylpyridinium bromide) mixtures: *r* =1 (1), Pb^{2+} –containing subphase; *r* = 0.5 (2), Pb^{2+} – containing subphase; *r* =1 (3) – pure subphase.

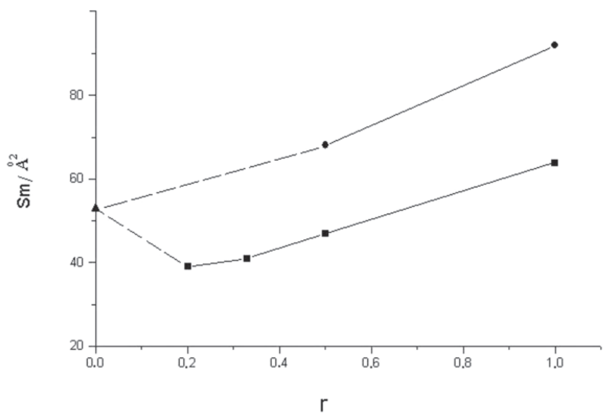

Figure 4S. The dependence of *r* vs. S_m for (**1** + *n*-octadecylpyridinium bromide) mixtures (—●—) and (**1** + *n*-octadecyl alcohol) mixtures (—■—) on Pb^{2+} – containing subphases; the point (—▲—) corresponds to pure **1** on Pb^{2+} – containing subphase.