Claims

[Claim 1] A process for depositing a film onto a substrate using a liquid composition, comprising the following steps:

a) formation of a film using the liquid composition,

b) placing the film in contact with the substrate, and

c) depositing the film on the substrate,

characterized in that

the liquid composition comprises a neutral surfactant and a charged lamellar compound,

the liquid composition is obtained by mixing the charged lamellar compound with the neutral surfactant, and

the concentration of neutral surfactant before mixing with the charged lamellar compound is less than the critical micelle concentration (CMC) of said surfactant, and wherein

- the neutral surfactant is a nonionic surfactant chosen from an ethoxylated alcohol, an ethoxylated alkylphenol, an ethoxylated fatty acid, an ethoxylated monoalkanolamide, an ethoxylated sorbitan ester, an ethoxylated amine, a glycol ester, a glycerol ester, a polyglycerol ester, a sorbitol ester, a glucoside, a polyglucoside such as an alkyl polyglucoside, a sucrose ester, an amine oxide such as lauryldimethylamine oxide, or a block copolymer including at least one amphiphilic block, and
- the charged lamellar compound is chosen from a lamellar clay, a lamellar hydroxide, a lamellar double hydroxide, $H_{3(1-x-y-z)}Li_{3x}Na_{3y}K_{3z}Sb_3P_2O_{14}$ with $0 \leq x \leq 1$; $0 \leq y \leq 1$; $0 \leq z \leq 0.5$ and $0 \leq x+y+z \leq 1$, $H_{(1-x-y-z)}Li_xNa_yK_zSbP_2O_8$ with $0 \leq x \leq 1$; $0 \leq y \leq 1$; $0 \leq z \leq 0.5$ and $0 \leq x+y+z \leq 1$, a lamellar oxide, a lamellar perovskite, a lamellar phosphate, a lamellar sulfide, a lamellar halide, a lamellar carbide and mixtures thereof.

[Claim 2] The deposition process as claimed in claim 1, in which the nonionic surfactant is a block copolymer including at least one amphiphilic block chosen from fluoro unit blocks, biological unit blocks, dendrimer unit blocks and poly(alkylene oxide) unit blocks.

[Claim 3] The deposition process as claimed in any one of claims 1 to 2, in which the substrate is an organic substrate or an inorganic substrate.

[Claim 4] The deposition process as claimed in claim 3, in which the organic substrate is chosen from a polymer, biological material, an organic semiconductor and an organic light-emitting diode.

[Claim 5] The deposition process as claimed in claim 3, in which the inorganic substrate is chosen from a ceramic, an aluminum oxide, a silicon substrate, a semiconductor material, a metal and a light-emitting diode.

[Claim 6] The deposition process as claimed in any one of claims 1 to 5, in which the neutral surfactant is a compound of formula $(PEO)_w$-$(PPO)_y$-$(PEO)_z$ in which w is between 5 and 300 and y is between 33 and 300 and z is between 5 and 300, the charged lamellar compound is $H_{3(1-x-y-z)}Li_{3x}Na_{3y}K_{3z}Sb_3P_2O_{14}$ with $0 \leq x \leq 1$; $0 \leq y \leq 1$; $0 \leq z \leq 0.5$ and $x+y+z = 1$ and the substrate is a protein crystal.

[Claim 7] The deposition process as claimed in any one of claims 1 to 6, in which steps a) to c) are repeated.

[Claim 8] A process for analyzing a substrate onto which a film is deposited, comprising the steps of the process of depositing a film as defined in any one of claims 1 to 7 and a step d) of analyzing the substrate onto which a film is deposited.

[Claim 9] A liquid composition comprising a neutral surfactant and a charged lamellar compound, in which:

- the neutral surfactant is a nonionic surfactant chosen from an ethoxylated alcohol, an ethoxylated alkylphenol, an ethoxylated fatty acid, an ethoxylated monoalkanolamide, an ethoxylated sorbitan ester, an ethoxylated amine, a glycol ester, a glycerol ester, a polyglycerol ester, a sorbitol ester, a glucoside, a polyglucoside such as an alkyl polyglucoside, a sucrose ester, an amine oxide such as lauryldimethylamine oxide, or a block copolymer including at least one amphiphilic block, and
- the charged lamellar compound is chosen from a lamellar clay, a lamellar hydroxide, a lamellar double hydroxide, $H_{3(1-x-y-z)}Li_{3x}Na_{3y}K_{3z}Sb_3P_2O_{14}$ with $0 \leq x \leq 1$; $0 \leq y \leq 1$; $0 \leq z \leq 0.5$ and $0 \leq x+y+z \leq 1$, $H_{(1-x-y-z)}Li_xNa_yK_zSbP_2O_8$ with $0 \leq x \leq 1$; $0 \leq y \leq 1$; $0 \leq z \leq 0.5$ and $0 \leq x+y+z \leq 1$, a lamellar oxide, a lamellar perovskite, a lamellar phosphate, a lamellar sulfide, a lamellar halide, a lamellar carbide and mixtures thereof,

the liquid composition being obtainable by mixing the charged lamellar compound with a solution comprising the neutral surfactant, the concentration of neutral surfactant in this solution being less than the critical micelle concentration (CMC) of said neutral surfactant.

[Claim 10] The liquid composition as claimed in claim 9, in which the nonionic surfactant is a block copolymer including at least one amphiphilic block chosen from fluoro unit blocks, biological unit blocks, dendrimer unit blocks and poly(alkylene oxide) unit blocks.