CLAIMS

1. A coating formed from a layered silicate/polymer composite comprising individual exfoliated silicate layers separated in a continuous polymer matrix, wherein the silicate content is less than or equal to 0.4 wt% (based on the total weight of the composite) and the scratch resistance of the composite is at least 2H measured in terms of pencil hardness in a pencil scratch test using a Pencil Hardness Tester; wherein the individual exfoliated silicate layers are oriented along a plane; wherein a thickness of the coating is of any value selected from 4 μm to 5 μm; and wherein the coating is formed by a method comprising:

    exfoliating sheet silicate in water to form a silicate suspension;

    replacing the water in the silicate suspension by a first organic solvent to form a silicate/organic solvent suspension;

    carrying out rotary evaporation on the silicate/organic solvent suspension to form a concentrated silicate/organic solvent suspension;

    contacting the concentrated silicate/organic solvent suspension with a solution of a hydrophobic polymer precursor in a second organic solvent to form a silicate/polymer precursor suspension, the silicate layers randomly dispersed in the silicate/polymer precursor suspension, the polymer precursor containing hydroxyl or carboxylic acid groups;

    coating the silicate/polymer precursor suspension on a substrate comprising applying a shearing force to the suspension to orient the dispersed silicate layers along a surface of the substrate;

    removing the first organic solvent and the second organic solvent;

    curing the hydrophobic polymer precursor of the coating of the silicate/polymer precursor using ultraviolet radiation to initiate cross-linking of hydroxyl or carboxylic groups of the polymer precursor with the silicate layers; and

    annealing the cured coating to form the layered silicate/polymer composite on the substrate, wherein the step of annealing forms chemical bonds between the silicate layers and the polymer matrix through cross-linking of the hydroxyl or carboxylic groups with the silicate layers.

2. The composite of claim 1, comprising individual exfoliated montmorillonite layers separated in a continuous polyacrylate matrix, wherein the montmorillonite content is 0.4 wt% and the scratch resistance is at least 2H.

3. A coated electronic device or packaging, comprising a coating formed from a layered silicate/polymer composite comprising individual exfoliated silicate layers separated in a continuous polymer matrix, wherein the silicate content is less than or equal to 0.4 wt% (based on the total weight of the composite) and the scratch resistance of the composite is at least 2H measured in terms of pencil hardness in a pencil scratch test using a Pencil Hardness Tester; wherein the individual exfoliated silicate layers are oriented along a plane; wherein a thickness of the coating is of any value selected from 4 μm to 5 μm; and wherein the coating is formed by a method comprising:

exfoliating sheet silicate in water to form a silicate suspension;

replacing the water in the silicate suspension by a first organic solvent to form a silicate/organic solvent suspension;

carrying out rotary evaporation on the silicate/organic solvent suspension to form a concentrated silicate/organic solvent suspension;

contacting the concentrated silicate/organic solvent suspension with a solution of a hydrophobic polymer precursor in a second organic solvent to form a silicate/polymer precursor suspension, the silicate layers randomly dispersed in the silicate/polymer precursor suspension, the polymer precursor containing hydroxyl or carboxylic acid groups;

coating the silicate/polymer precursor suspension on a substrate comprising applying a shearing force to the suspension to orient the dispersed silicate layers along a surface of the substrate;

removing the first organic solvent and the second organic solvent;

curing the hydrophobic polymer precursor of the coating of the silicate/polymer precursor using ultraviolet radiation to initiate cross-linking of hydroxyl or carboxylic groups of the polymer precursor with the silicate layers; and

annealing the cured coating to form the layered silicate/polymer composite on the substrate, wherein the step of annealing forms chemical bonds between the

silicate layers and the polymer matrix through cross-linking of the hydroxyl or carboxylic groups with the silicate layers.