Water and dust buildup on a variety of surfaces, such as decks, pillars, ceiling fans, refrigerator cooling coils, and blinds, can cause many problems including reduced performance and life, as well as increased maintenance cost. Dust resistant and moisture resistant coated mechanical components can reduce energy consumption via aerodynamic drag reduction during operation—in particular, residential, commercial, or industrial fans used in air handling systems. The application on refrigeration cooling coils can further increase the efficiency of the refrigerator and consume less energy by avoiding dust formation on the coils and enabling increased heat transfer.

UCF researchers have created a water-based nanoparticle suspension that forms a water and dust resistant coating on surfaces. Specifically designed for in-field application, this easily formulated, low cost, and easy-to-spray coating reduces dust adhesion by 95% and can be applied to a variety of exposed surfaces including walls, windows, fan blades, air conditioners, solar cell panels, and cooling coils. It can also be used in any paints that require water resistant properties such as stain resistant, dust resistant, water resistant, and corrosion protection coatings.

**Technical Details**

This composition is an aqueous solvent-based coating made of an alkaline aqueous solution of three components. The first is chemically condensable with itself and is independently cross-linkable (e.g. glycidoxypropyl-trimethoxysilane). The second component is also chemically condensable with itself as well as with the first component, and it contains one of a fluorocarbon functionality and a hydrocarbon functionality (e.g. perfluorooctyltrichlorosilane, or, alternatively, an alkyltrisubstituted silane). The optional third component is chemically condensable with the first and second components, but is neither independently cross-linkable nor includes at least one of the fluorocarbon functionality and the hydrocarbon functionality (e.g. cerium nitrate).

This coating can be cured with a similar composition. The cured first component is condensable with itself and independently cross-linkable. The cured second component is also condensable with itself as well as the first component, and includes at least one of a fluorocarbon functionality and a hydrocarbon functionality. The cured third component is condensable with itself, the first and second components, and neither independently cross-linkable nor at least partially fluorinated.

This coating formulation may be applied using any of several methods including but not limited to dip coating methods, spray coating methods, roll coating methods, as well as any other conventional and non-conventional methods.

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Benefits

- Reduces dust adhesion by 95%
- Low in cost
- Easily fabricated
- Sprays easily
- Ambient temperature application
- Formulated to bond to steel, glass, and plastics surfaces
- Expected performance over three years

Applications

- Surface exposed to dry or humid, dusty environments
- Air handling systems
- Mechanical fans
- Decks
- Pillars
- Refrigerator cooling coils
- Window blinds

Additional Technology Numbers: 33231

Technology #33012
- US Patent Pending

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