FRESH KICKS

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Problem

White shoe sidewalls
1. Easily dirtied by:
   a. Mud/dirt
   b. Plant fluids/other stains
   c. Other pigments/substances
2. Dirtying is exacerbated by:
   a. Scuffing/abrasion
   b. Cutting by various objects
   c. Piercing by various objects
3. Dirtied shoes are replaced more quickly
   a. Expensive for owners
   b. More waste in environment

Our Design

- Layered, "tear-off" system for instant, easy cleaning, based on butterfly scales
- Each layer contains dual-strength bilayer, based on abrasion and impact resistant cuticle of scorpion
- Manufactured in pre-layered sheets or strips
- Easily adaptable to current shoe designs
- Anisotropic Bilayer makes sidewalls resilient to scratching, abrasion and puncturing, while removing easily to counter adhesion and staining

Design Superiority
- Very thin
- Easy application to existing shoe styles
- Keeps shoes looking new
- Lasts for over 2 years with a single application
- Resists abrasion, removes dirt and stains

Alternate Sources of Biological Inspiration

Desert Scorpion
- Alternating hard & soft layered cuticle
- Resists beating from sand and winds
- Abrasion/impact resistant

Butterfly Scales
- Layered scales with anisotropic weakness
- Normal force causes scales to shed
- Adhesion resistant

Butterfly Wings
- Hydrophobic nanostructure
- Water beads and carries away dirt
- Passively self-cleans

Pitcher Plant
- Anisotropic microstructure
- Both hydrophobic & oleophobic
- Non-stick surface

Marble Berry
- Tightly coiled cellulose
- Constructive interference, Bragg Reflection
- Maintains bright color