Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Case ID:M22-033P
Published: 1/9/2024

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Artificial Vegetation with Engineered Reflectance Spectra for Urban Cooling Applications

Background

Cities are continuing to experience rising temperatures due to a combination of local and global drivers. In summer, this warming results in increased heat-related morbidity and mortality, increased energy consumption and cost, and increased water use. The impacts of extreme heat are particularly severe in cities throughout hot desert regions globally where water resources are also limited.

The use of vegetation is a common strategy to provide shading and/or evaporative cooling at the local scale. Visual proximity to vegetation, whether real, artificial, or in pictures/paintings, has also been shown to provide mental health benefits. However, in many urban environments, trees create significant problems in that they are slow growing and can interfere with above- and below-ground infrastructure. Common alternatives for shade trees include artificial shade structures, which lack the aesthetic and mental health benefits of trees.

In recent years, there has been research in the coatings industry around producing cooler surfaces. These novel materials include specialized pigments and additives for paints that result in higher overall solar reflectance than conventional coatings. However, this technology has not yet been applied to artificial vegetation applications.

Invention Description

Researchers at Arizona State University are exploring novel artificial vegetation technology using specific additives and pigments that modify the spectral reflectance of the product across wavelengths of importance for maintaining cool surfaces. This includes high solar reflectance in wavelengths <2500 nm and low reflectance in thermal radiation wavelengths (>4000 nm). This technology provides an overall urban cooling effect while removing the maintenance and irrigation needs associated with existing alternative natural and engineered solutions. This technology can be used to replace conventional artificial turf or exposed dirt/gravel in residential yards, parks, and other areas of outdoor recreation.

Potential Applications

- Artificial vegetation to replace existing turf, artificial turf or exposed dirt/gravel
- Artificial vegetation for shading applications

Benefits and Advantages

- Can easily replace existing solutions
- Cooler temperatures observed in the hot sun than existing products
- Removes need for maintenance or irrigation
- Reduction in airborne dust/dirt that can contribute to air pollution