

MossSkin as a Nature-Based Solution for Climate-Friendly Urban Buildings

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Green architecture focuses on designing and constructing buildings that minimize environmental impact while improving resource efficiency and sustainability. Key principles include energy conservation, sustainable material use and ecological balance. Urban challenges like heat islands and pollution drive demand for nature-based solutions. Moss-based materials such as MossSkin are emerging as innovative components in climate-responsive construction. MossSkin is a bio-material composed of preserved or living moss cultures incorporated into modular panel system. Unlike conventional construction materials, it utilizes natural physiological properties of moss including moisture absorption and passive gas exchange. These panels can be installed on interior/exterior surfaces without soil, irrigation systems or intense maintenance, making them highly suitable for sustainable architecture

Role of MossSkin in Climate-Friendly Buildings

- Regulates temperature and humidity thus contributes to climate friendly buildings
- Improves air quality by absorbing CO₂ and pollutants
- Reduces energy consumption and supports sustainable building design

Moss Panels: Moss grown on substrates like felt, fabric, or foam and these panels attached to walls as living systems.

Methods Involved in Preparation of Moss Concrete

Moss Concrete is a type of living/biological concrete that supports moss growth on bio-receptive surfaces

Steps:

1. Preparation of Moss Concrete Mix:

Base layer: Portland cement-based mix and bio-receptive porous layer.

2. **Surface Treatment** :Introduce texture and roughness

3. **Moss Inoculation**: Natural colonization or artificial slurry

4. **Application**:Mount prefabricated panels on walls



Installation Steps

- Waterproof backing layer
- Fabric/porous substrate placement
- Moss slurry or fragment inoculation
- Irrigation (drip/misting)
- Mount panels using frames/brackets

Moss Species Highlighted

- *Barbula unguiculata*
- *Tortula muralis*
- *Hypnum jutlandicum*
- *Rhynchostegium confertum*



Table 1: Moss Species Suitable for MossSkin

Climate Zone	Recommended Species	Key Characteristics
Tropical Regions	<i>Fissidens bryoides</i> , <i>Taxithelium planum</i> , <i>Hyophila involuta</i>	Thrive in high humidity, shade-loving
Subtropical Regions	<i>Tortula muralis</i> , <i>Funaria hygrometrica</i> , <i>Barbula unguiculata</i>	Drought-tolerant, survive full sunlight
Temperate Regions	<i>Hypnum cupressiforme</i> , <i>Leucobryum glaucum</i>	Cold-hardy, aesthetic ground cover

Environmental and Ecological Benefits

Moss-based systems improve air quality by trapping pollutants and contribute to mitigation of the Urban Heat Island effect through surface cooling. They provide acoustic insulation, are lightweight and easy to install, support urban biodiversity, and enhance visual appeal, making them effective components of sustainable and climate-resilient green infrastructure in modern buildings.

Conclusion

MossSkin is an advanced bio-integrated building material that incorporates living moss into structural systems. It enhances air quality by filtering pollutants, improves thermal performance through natural insulation, reduces the overall carbon footprint, and supports the development of sustainable, energy-efficient, and environmentally resilient urban architecture in modern cities.

Future Scope

MossSkin has strong potential for large-scale adoption in residential and commercial buildings, with integration into smart city infrastructure. Future research should focus on growth optimization, cost-effective production, and seamless incorporation into green systems. It offers a promising pathway toward long-term ecological sustainability and climate-resilient urban development.

References

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