**Objective**

This paper discusses the possibility, advantages, problems, and future prospects for the use of biomaterials in the production of consumer goods and electronic devices through additive manufacturing.

**Introduction**

The additive manufacturing or 3D printing has changed the whole process as it is done with higher precision, in better words, and with lesser cost. The well of environment-friendly biomaterials instead of the petroleum-based one has brought plant-based polymers, algae, and bioplastics. Biomaterials in AM for consumer durables and electronics are discussed in this report.

Main Findings

**1. Biomaterials and AM**

**Advantages of Biomaterials in AM**

**Environment-Friendliness:**

Biomaterials offer the opportunity of reducing the usage of fossil fuels and carbon emission.

Biodegradability is the elimination of the generation of electronic waste

**Material Properties:**

Certain biomaterials possess excellent mechanical properties. For example, PLA (Polylactic Acid) would be well suited for such applications of consumer electronics

Biomaterials can also be engineered to exhibit flexibility, stiffness, or resistance to heat.

Market Appeal

The growing environmental conscious consumers start using products made from environment-friendly materials

Brings Brands closer to perfecting their sustainability story

**2. Consumer Electronics Applications**

Housings and Casings

Bioplastics would replace the usage of plastics for casings of smartphones, laptops, and everything else that comes in the form of wearables.

**Internal Components:**

Lightweight biocomposites would be used in the structural aspects of gadgetry like drones and gaming consoles.

**Design Flexibility :**

Biomaterial is going to provide an avenue by which consumers could make custom product through AM. An example here would be designing an ergonomic keyboard or headphones which are more 'eco-friendly'

Accentuation

Biomaterials are better suited for phone stands, earbuds, and watch straps.

**3. Problems**

**Physical Limitations**

Biomaterials cannot outdo petro-based plastics as it related to the performance electronic hardware. The materials might not be as durable, nor very heat resistant.

Biomaterials that can be used for parts have highly limited electrical conductibility.

**Cost Factors:**

 Biomaterials, compared to petro-based plastics are expensive for the fact of having more physical restrictions in its manufacturing.

**Processing Problems:**

Some biomaterials will degrade if processed under particular temperature conditions, which means it will just be limited to some susceptibility to AM.

**Post-Use and End-of-Life Issues:**

Although biomaterials are biodegradable, they still have a need to degrade in a specific condition and recycling infrastructure has not yet been fully developed.

**4. New Trends**

**Hybrid Materials**:

Hybrid materials with biomaterials and conventional plastics or composites, which improve performance with sustainability.

Conductive Biomaterials:

Conductive additives incorporated into biomaterials can make biodegradable circuit boards and sensors.

Circular Economy Models

Bioplastic-based devices can be designed as recyclable and reusable in a circular economy.

**5. Recommendations**

**Research and Development**

More research work has to be carried out to improve the thermal and mechanical properties of the biomaterials to determine the scope of application for the super-performance product

Partnership

Join partnership with green material innovation start-ups and research organizations

**Customer Education:**

Public education of the benefits of the product which is derived from nature has to be improved and has to be anticipated that it will also raise the level of its acceptance

**Infrastructure Development**

A recycling program of biomaterial-based electronics should, in such a structure, make sure it either sees to the appropriate disposal or reuse of it.