

A cover for the single-person pedal-powered vehicle

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1 Introduction

Cardiovascular diseases have received increasingly widespread social attention for many years. It is known that the leading cause of cardiovascular diseases are prolonged sitting and lack of exercise, and moderate daily exercise can significantly reduce the risk of developing such diseases.[1, 2] To reduce the risk of cardiovascular diseases, governments around the world are encouraging commuting by bicycle to ensure daily moderate exercise. As a result, there is growing interest in Single-Person Pedal-Powered Vehicles (SPPPVs), and much study in recent years endeavored to improve the safety and comfort of bicycles.[3, 4]

Among all the innovative efforts of research teams, the design by the Kelvin team is particularly promising. In 2013, they proposed a cage structure based on carbon fiber material, which significantly improved the safety of the vehicle without adding much weight.[5] In 2015, they further designed a streamlined cover for the carbon fiber frame, which can isolate pollution and provide protection against wind and rain, allowing SPPPVs to operate normally even in harsh weather conditions.[6] However, poor ventilation became the biggest drawback of this design. Therefore, in 2019, the Trek team added a mesh filter to address the ventilation issue ingeniously.[7] Unfortunately, excessive additional structures increased the weight of the vehicle and reduced aerodynamic efficiency, prompting recent criticisms in this regard.[8, 9]

To further improve, our study has identified a novel multi-polymer material for the cover. This material can isolate rainwater and pollutants while allowing for the exchange of fresh air, addressing the ventilation issue without adding extra structures. Moreover, compared to the original cover material, it is more easily recyclable and environmentally friendly. In the article, we first describe the preparation method of this material, then we experimentally examine its selectivity and degradability.

References

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