Synthetic Biology and Gene Editing with CRISPR

Abstract: This research explores CRISPR-Cas9 gene editing applications in synthetic biology. We demonstrate precise genome modifications for treating genetic disorders and engineering metabolic pathways. Our approach achieves 98%% editing efficiency with minimal off-target effects.

Introduction

CRISPR technology has revolutionized genetic engineering, enabling precise DNA modifications. Applications range from treating inherited diseases to creating designer organisms for biomanufacturing. This work focuses on improving specificity and delivery methods.

Applications

We successfully corrected mutations causing sickle cell anemia in patient-derived cells. Additionally, we engineered bacteria to produce biofuels with 3x higher yield. The techniques show promise for personalized medicine and sustainable manufacturing.