# Research on the Conversion of Waste Straws into High-Octane Gasoline

Pan, Ziqi (School: Beijing No. 4 High School)

Conversion of waste straws into high-octane gasoline represents a potential solution to the depletion of fossil fuels and pollution associated with their extraction and combustion. While current production methods suffer from drawbacks such as poor quality of the product and inability to separately or directly use the gasoline, the complete low-cost conversion approach is the main objective of this study. This study investigates the key factors in waste straw conversion including catalyst, temperature, and pressure in the following reactions: ?Cellulose to levulinic acid (LA) ?LA to ?-Valerolactone (GVL) ?GVL to butene, and ?butene/isobutane to gasoline. The approach presented herein afforded high catalytic conversion. After subsequent evaluation, the improved approach was able to produce 21.86 mass units of 94.9 octane-number gasoline from 100 mass units of waste straw. This was achieved using a non-noble ruthenium/carbon catalyst in the conversion of GVL, replacing the gold/platinum catalyst, and reaching a conversion rate of 91.4% and a yield of 75.2%. This improved process effectively reduces the cost and energy consumption of the waste straw conversion, while simultaneously avoiding heavy metal pollution (i.e. gold, silver, copper, iron, or lead from the catalyst).

**Awards Won:**