Heterogeneous Organo-catalysis: Sustainable Pathways to Furanics from Biomass

Sanny Verma[a] and Rajender S. Varma[b]*

[a]Oak Ridge Institute for Science and Education, Oak Ridge TN, 37831, USA

[b]Sustainable Technology Division, National Risk Management Research Laboratory

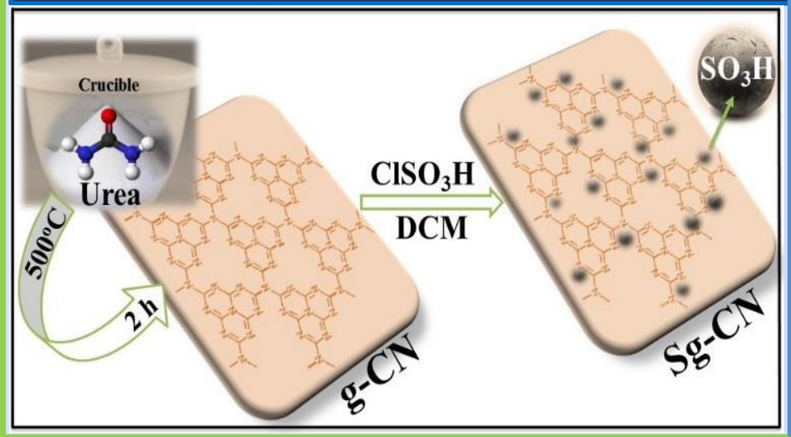
U. S. Environmental Protection Agency, 26 West Martin Luther King Drive, MS 443 Cincinnati, OH, USA

*E-mail: varma.rajender@epa.gov

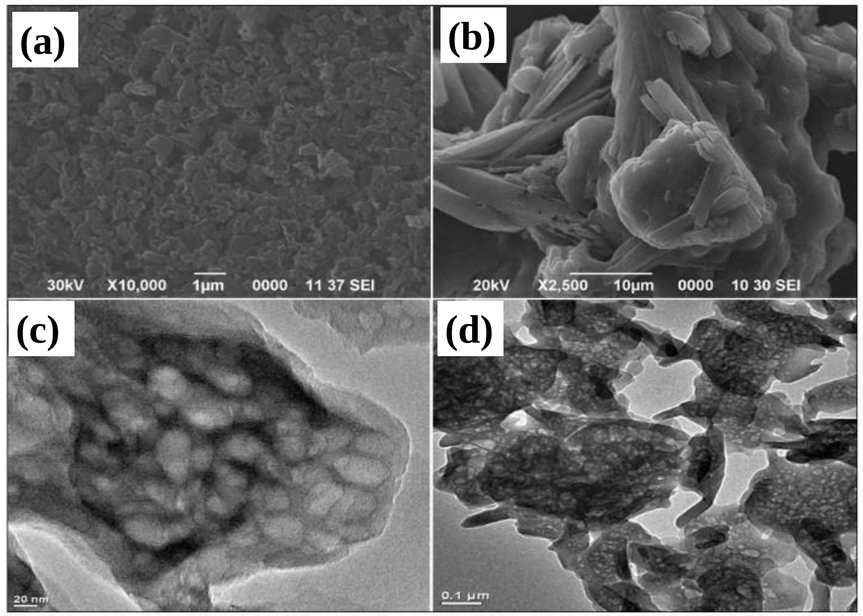
Introduction

Glucose and fructose are among the most abundant plant-derived materials and have been converted into useful building units often used in drug discovery and polymer architecture. Unfortunately, most of these conversions require mineral acids and complex heterogeneous catalysis systems which suffer from the diminished activity and recyclability issues. Herein, we report a highly reactive and inexpensive heterogeneous sulfonated graphitic carbon nitride (Sg-CN), endowed with strong acidity that readily transforms carbohydrates to furanics. The availability and benign nature of the material and its stability over several reaction cycles renders this catalyst very useful in organic synthesis, the polymer industry, and in the preparation of drug precursors.

Synthesis of Sg-CN

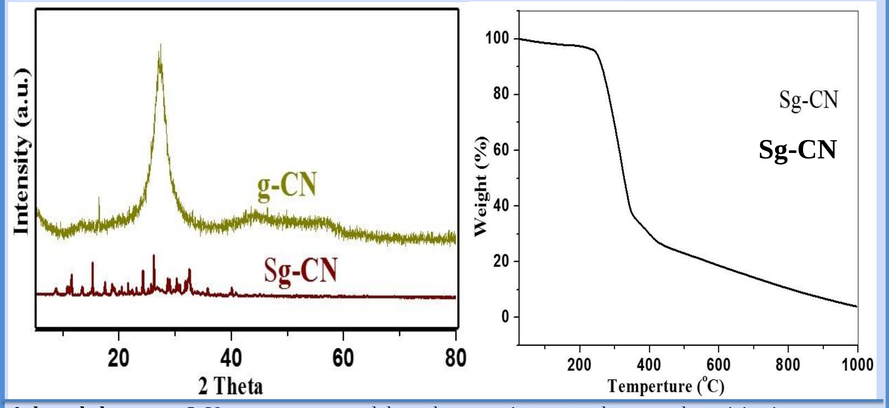


Characterization of Sg-CN



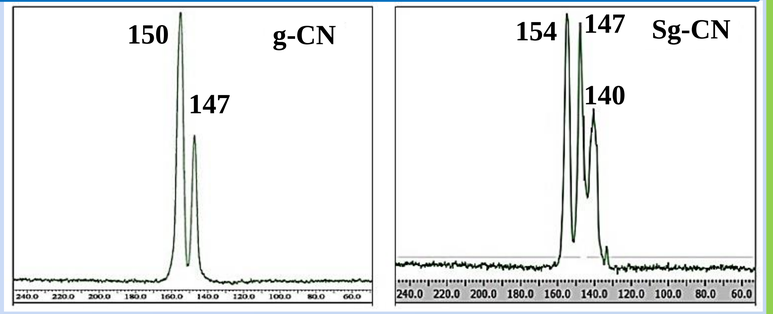
SEM image of a) g-CN and b) Sg-CN; TEM image of c) g-CN and d) Sg-CN

XRD and TGA analysis of Sg-CN

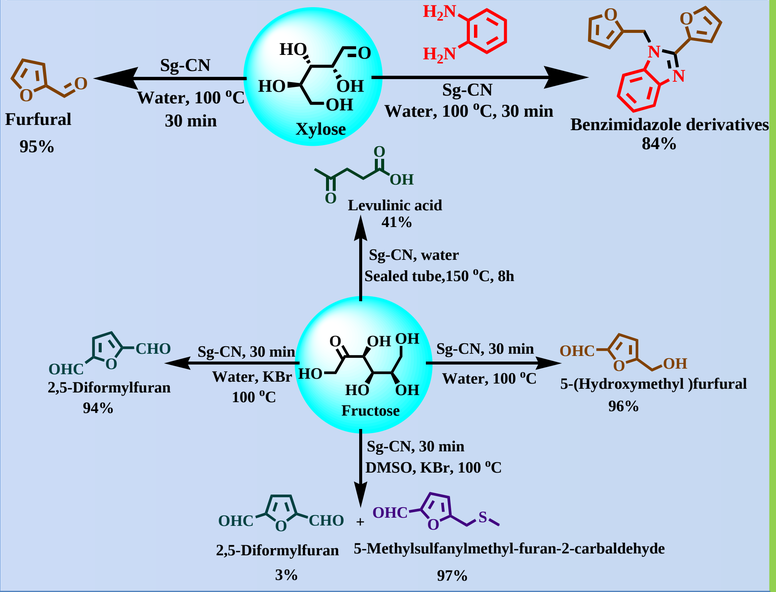


Acknowledgements: S. Verma was supported through an appointment to the research participation program with the oak Ridge Institute for Science Education through US DOE and US EPA.

Solid state ^{13}C NMR



Application of Sg-CN: Sustainable Pathways to Furanics from Biomass



References: 1) *Green Chem.*, **2017**, *19*, 164-168.

2) *Scientific Reports*, **2016**, *6*, 39387.