

### **Metal-doped carbon dots for biodiesel synthesis**

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#### **Introduction**

Carbon dots are promising transesterification catalysts due to their large surface area and easily modified surface [1]. Often synthesized from renewable sources, carbon dots offer a sustainable approach to biodiesel synthesis. Metal doping can be used to enhance catalytic potential through introduction of new active centers, which alters its electronic properties and improve the electron transfer and binding selectivity to reactants, improving reaction rates [2].

#### **Main part**

In this study, manganese-doped carbon dots were synthesized via a one-step hydrothermal route. Fourier-transform infrared spectra confirmed successful doping, and energy dispersive X-ray indicated uniform metal distribution throughout the carbon matrix. The resulting carbon dots were used to catalyze the synthesis of biodiesel from sunflower oil and methanol under hydrothermal conditions. Fourier-transform infrared spectra showed bands characteristic of biodiesel, while gas chromatography-mass spectrometry confirmed the presence of fatty acid methyl esters, confirming biodiesel synthesis. Using the proton nuclear magnetic resonance spectroscopy, a recovery of 94% was obtained.

#### **Conclusion**

Carbon dots have demonstrated catalytic efficiency in the synthesis of biodiesel. Their retention in the final product leads to an upgraded fuel that burns better and generates less greenhouse gases.

#### **List of literature**

- [1] Tracey C. T., Sahvronskeya D. O., Shao J., Yang H., Krivoshapkin P. V., Krivoshapkina E. F. // *Fuel*. 2024. Vol. 362, p. 130882.
- [2] Wang Y., Zhang Y., Jia M., Meng H., Li H., Guan Y., Feng L. // *Chemistry – A European Journal*. 2015. Vol 21(42), pp.14843-14850.