APPLICATION OF NANOCOMPOSITES TO GRAPE WASTES PROCESSING FOR IMPROVE BIODIESEL PRODUCTION

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Introduction:

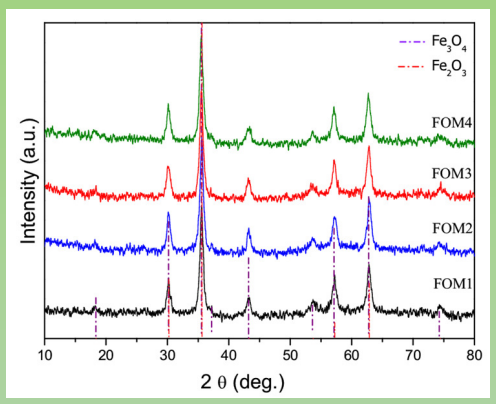
Biodiesel production has received a special attention in the recent years due to its advantages in the conservation of the fossil fuels and production is becoming more and more important. Different methods for production are tested. Biodiesel can be obtained from different vegetable oils or animal fats and can be a natural substitute for petroleum-based fuels, with the similar or sometimes even higher properties. In plus, it is renewable, biodegradable and nontoxic. For socioeconomic reasons, edible oils used for biodiesel production should be replaced with other sources with lower costs like is the oil obtained from grape wastes, since over 20% of grape becomes waste during the production of wine.

Characterization:

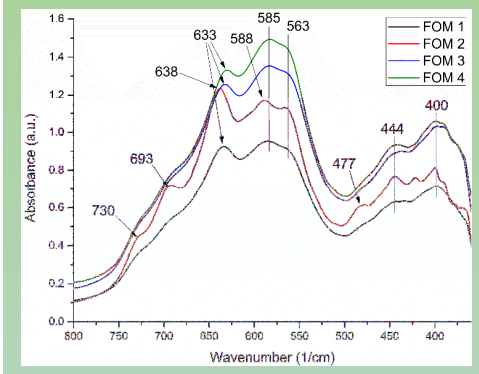
The formation of magnetic nanocomposites was confirmed by the latest microscopic/spectroscopic techniques, namely: XRD, BET, TEM, SEM, EDS, VSM among others.

Synthesis conditions for FOM samples:

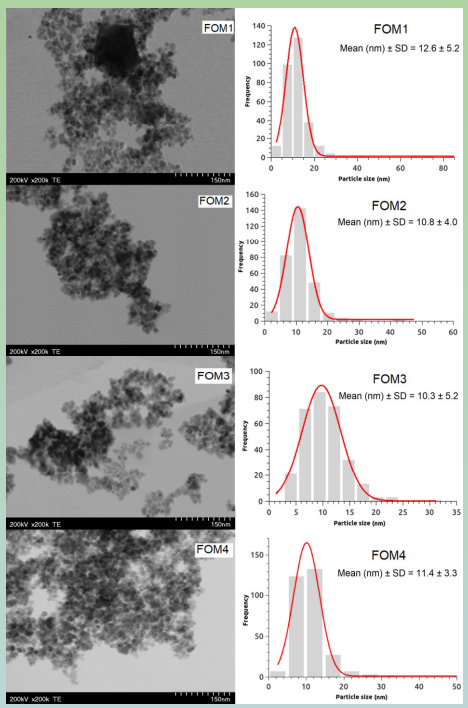
Nr. crt.	Fe_3O_4	$MnSO_4$	Urea	Oregano extract [mL]	$MnSO_4$ and urea (v/v)	Sample code
1	0.5 g	0.036 M	1 M	-	10:1	FOM 1
2		0.072 M	2 M	-		FOM 2
3		0.018 M	1 M	-		FOM 3
4		0.018 M	-	20		FOM 4



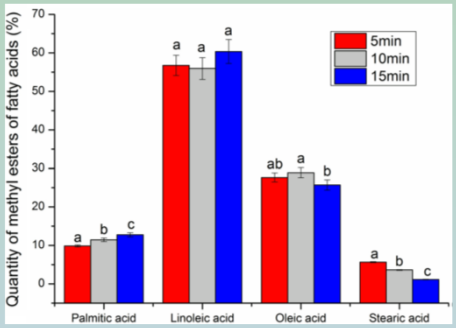
XRD diffraction patterns of FOM samples



FT-IR spectrum of FOM 1-4 samples, 800-360 cm^{-1} spectral range



TEM images of Fe_3O_4/MnO_2 (FOM1) and the grain size distribution histograms for samples prepared nanocomposite.



The **quantity (%) of methyl esters** of fatty acids in the biofuel prepared in the presence of FOM1 catalyst and microwave irradiation (800 W).

Conclusions:

- ✓ The analysis of the final results revealed that the samples chemically prepared show smaller sizes, specific surface area higher and porosity lower than the sample prepared using plant extract.
- ✓ The Fe_3O_4/MnO_2 nanocomposites with the highest specific surface area from all prepared nanocomposites, FOM1, were tested for microwave assisted transesterification studies.
- ✓ It has been shown by preliminary results that the Fe_3O_4/MnO_2 nanocomposite can be successfully used as catalyst for improving of biodiesel production.
- ✓ For all tests using FOM1 as catalyst, the resulted FAME's mixture consists mostly of C18:2, obtaining promising preliminary results. The highest quantity of linoleic acid was obtained by microwave treatment for 15 minutes at 800W.

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