**Instructions for oil drop spectral analysis programs**

The program MATLAB is required to run these analysis programs. MATLAB is case-sensitive, and all commands must be entered exactly as described. All instructions, descriptions, and other information will be shown in normal text, while MATLAB commands will be shown as following the MATLAB command prompt (>>).

1. Download the program files and place them into the MATLAB working directory.

2. Start the MATLAB program, and enter the main program name to start analysis:

 >> OilDropSpecV4

3. When prompted, input the source directory for the \*.dat files to analyzed (the file path). Text entries must be enclosed in single quotes (e.g. 'text') to be recognized by MATLAB. Also, do not end the file path with a slash:

 Give the file path for your input files (enclose in single quotes):

>> 'C:\ExampleDirectory\MSPfiles'

While OilDropSpec can analyze one file at a time, it is most efficient for groups of files.

4. When prompted, enter the number of words in the "species" row of the input files. For example, AMGO = 1, Carduelis tristis = 2, Carduelis tristis AMGO = 3, etc. Do not use single quotes when entering numbers.

5. When prompted, enter the file name. Enclose the file name in single quotes, but do not include the file extension:

 Input filename (inside single quotes, no file extension): >> '01050024'

6. OilDropSpec will now plot the data from the file and ask several questions. When indicated, integers must be used. The user will have the opportunity to review the baseline and peak, and adjust them if necessary. When finding the baseline, enter a starting value to the right of the peak and to the left of the baseline. When finding the peak, the user will provide a range of wavelengths that OilDropSpec will use to fit a quadratic curve.

7. When the peak and baseline are determined, a zoomed-in graph will appear to facilitate more accuracy for the remaining calculations. When prompted, enter an approximate value for lambda mid (where the magenta line crosses the data curve). This value only needs to be approximate, because OilDropSpec will calculate a precise value.

8. The best-fit line used to find lambda mid will appear on the graph, and OilDropSpec will provide the r2 value. If the r2 value is low, a warning will be displayed. OilDropSpec calculates other variables related to lambda mid that are not visible until data output.

9. Answer the prompt of whether data collection is complete. If data collection is not complete, the program will cycle back through all steps beginning at step 5. If data collection is complete (or a sufficiently large number of files has been processed), the collected data will be exported into a Microsoft Excel (\*.xls) file located in the same directory as the data files. The output file is named by OilDropSpec with time-based identifiers, and can be renamed to anything the user desires. Output will take at least ~30 seconds, depending on how many files have been processed.

**Troubleshooting**

The program ODSfail is a backup program in case MATLAB encounters any sort of error while running OilDropSpec. ODSfail contains the output portion of the main program, and can be used to prevent data loss if an error is encountered. ODSfail should not be run unless OilDropSpec has already been used to completely process one data file.

IF at least one file has been completely processed by OilDropSpec AND an error has occurred to prevent output, run ODSfail:

 <error message>

 >> ODSfail

Please report any errors to the developer (Tim Sesterhenn, iposita@gmail.com) and provide any useful information as described by ODSfail.

IF no files have been completely processed by OilDropSpec AND an error has occurred that stops the program, the entire session must be restarted:

 <error message>

 >> clear all

 >> OilDropSpecV4

OilDropSpec uses a counter to organize the output data correctly. If the MATLAB workspace is not cleared following an early error, the output file will not be properly organized.