SEMICONSOFT, INC.
Semiconductor Metrology Company

Absolutely no hardware or Operating system lock. Combine data from different sources; model them together or separately. Use your preferred measurement hardware and operating system.

Measurement Data Import Formats

TFCompanion software supports data imports in wide range of commonly used formats.
Following formats are currently supported:

- ✓ Sopra/KLA-Tencor
- ✓ Rudolph Technologies
- ✓ Filmetrics
- ✓ J.A.Woollam/Nanometrics
- ✓ Beaglehole Instruments
- ✓ Jobin-Yvon/Horiba
- ✓ Nanofilm
- ✓ TFCompanion format
- ✓ Excel (free form format)

Software automatically recognizes supported data formats. If your data has a different format that is not currently supported – you can either convert data in TFCompanion format or put data in Excel spreadsheet for import.

TFCompanion provides a very easy and flexible text format that supports both ellipsometry and reflectance/transmittance data. Data can be comma or space separated. Several measurements e.g. Reflectance& transmittance, or spectra taken at different angles, etc. can be concatenated in the same file.

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Following example shows TFCompanion formatted Reflectance data with comma separator:

```
TFC_DATA
[ header fields below are options, lines with square brackets are ignored during parsing
# this is a comment
#Date:Nov 9, 2008 11:03:09 AM
#Location:0.0,0.0
#WaferId:optional
#WaferLot: optional
#User: optional
[ end of the optional header lines
Wavelength:Angle:Reflectance
nm
450.0,  0.0,  0.5424
451.0,  0.0,  0.5140
452.0,  0.0,  0.5213
453.0,  0.0,  0.5176
```

Following is an example of ellipsometry data in TFCompanion format:

```
TFC_DATA
Wavelength:Angle:Delta:Psi
nm
300.0   70.00   218.964164   30.440233
305.1   70.00   225.675266   30.215575
310.1   70.00   231.483786   30.324429
315.2   70.00   236.645279   30.681542
```

Following is an example of ellipsometry data with s.d. values:

```
TFC_DATA
# This is a comment for testing
# Date: April 12,2006
# Location:10,5
# WaferId:TestWafer
# WaferLot:1
# User: John
Wavelength:Angle:Delta:Psi:sd_Delta:sd_Psi
nm-deg
240.1   70.00   93.931937   21.774168   0.2  0.1
242.3   70.00   143.497753   31.700100  0.2  0.1
277.9   70.00   88.559312   40.880459   0.2  0.1
313.5   70.00   62.057384   47.162740   0.2  0.1
```

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Importing data from Excel.

Importing data from Excel file (*.xls) allows additional flexibility. User can select rows and columns to import and assign value types and units. Importing sequence is shown on Fig. 1, 2.

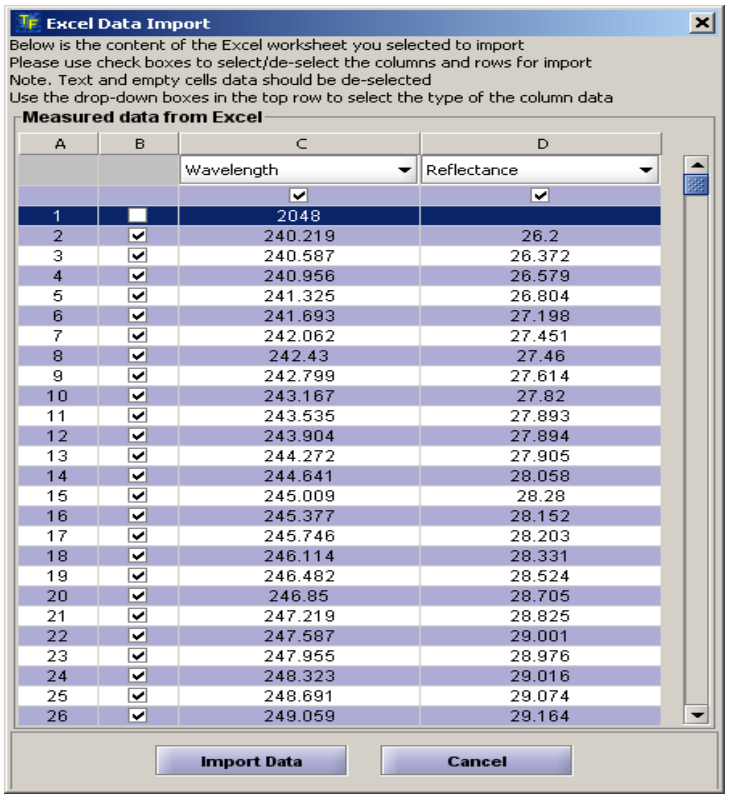

Fig. 1 Importing data from Excel. User selects rows and columns to import and assigns a type of the values.

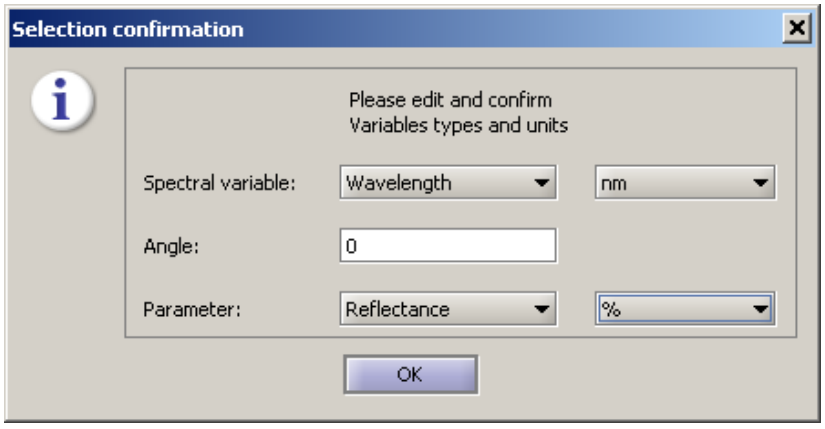

Fig. 2 Units and other additional information is selected during the import.

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Materials Import/Export Formats

TFCompanion has a large library of material (tabular type). Materials are stored in the database (in binary form) but TFCompanion allows import and export materials in the text file format.

Following standard formats are currently supported:

- ✓ SOPRA/KLA-Tencor
- ✓ Horiba/Jobin Yvon
- ✓ TFCompanion

Supported format are automatically recognized during the import. During export, user can select a type of the format to export.
If you have materials data in a different format you can convert it to one of the supported formats.
Below are examples (full and simplified) of a TFCompanion material format.
Full format allows to define units of wavelength and n,k values, abbreviated format only defines units of the wavelength .
Example 1: full format
// line 2 indicate units of wavelength and optical constants. See the codes below.
TFC_Material: nm-n,k
1-3
Comment: Palik HOC II data
248.0, 2.480, 2.200
250.5, 2.477, 2.122
253.0, 2.480, 2.040
255.6, 2.486, 1.961
258.3, 2.490, 1.890
261.0, 2.488, 1.840

Example 2: abbreviated format (1 on the first line indicate nm unit of the wavelength)

1
SILICON DATA, from Aspnes
206.63333, 1.01008, 2.90917
210.13559, 1.08306, 2.98228
213.75862, 1.13279, 3.04470
217.50877, 1.18606, 3.11957

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Wavelength units code:
0 – Angstroms
1 – Nanometers
2 – Micrometers
3 – Inverse centimeters

Optical constants units codes:
0 – DC Physical: ε1-i ε2
1 – DC Optical: ε1+ i ε2
2 – NK Physical: n – i k
3 – NK Optical: n+ i k

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