

MACRO PROGRAMMING LANGUAGE

SCRIPT

Part of the software plug-in AS (automatic series measurements)

Define the test procedure to meet your requirements

The *IM6* system provides a multitude of functions to ease the standardization of measurement processes. For example, a measurement can be repeated as often as you like without having to set up parameters again and again each time. As parameter sets are automatically saved with each measurement file, you only have to load the desired parameter set needed - and you are ready to repeat the measurement. With this feature, simple, recurring measurement tasks can be handled also by inexperienced personnel.

Another step in this direction is performed by the "automatic series measurement" software (**AS**) of the *IM6* system. Here, measurements of the same method are triggered by a third parameter. With **AS**, you are able to perform impedance measurements in dependence of time, potential, temperature, pH and others. The results are three-dimensional graphs or a series of single plots.

Many tasks in electrochemistry require the combination of different sampling and analysis methods and with this the definition of a single complex process which can be used as a standard testing method. This is the reason for our developing a scripting language for the *IM6* system, which on the one hand allows to combine different methods with macro commands very quickly and easily, and on the other hand is able to define a process to the essential details.

The commands available in **SCRIPT** are divided into two groups:

1. **SCRIPT** keywords are macro commands with which you can call a complete, predefined method. This group of commands will certainly be used the most, because they require absolutely no knowledge of programming and nevertheless have access to very specific methods.
2. With **andiBASIC** commands, you can write your own sampling and analysis routines, you can react to external events or you can set very special parameters. The use of these commands, of course, requires a certain knowledge of the **andiBASIC** language.

Point 1 has been given highest priority regarding the development of **SCRIPT**. We tried to find an easy way for combining different methods in order to get a complex process which does not expect the knowledge of a programming language. With the keyword part of **SCRIPT**, each user, who set up and saved the parameter set of each method, is able to access this library of single methods and combine them to a complex process by simply loading them in sequence.

In principle, scripts are edited with a common word processor. If the integrated text editor is used, editing, interpreting and testing will be done in an interactive way. You write down the desired keywords as uncoded text, call the interpreter and do a test run. The **SCRIPT** interpreter translates the keywords and helps to avoid syntax errors. Each script gets an icon which is implemented in the **SCRIPT** menu page. This icon is used to start a script process. If the script is set up you can save it. **SCRIPT** automatically saves I/O parameters and system messages which occur in the course of a process as a protocol text file. This is helpful for testing scripts under development and gives information to the problem of failed measurement procedures.

To show the easy handling of this macro language, here an example. First an impedance and a CV measurement are carried out, then the measured data are loaded into the analyzing program to be analyzed and plotted.

SCRIPT_START	Script start
MEAS_OPEN_EIS(2,"8:\archive","eis1")	Loads the predefined impedance parameter set "eis1" from the path "archive" of the harddisk
MEAS_EIS	Starts impedance measurement
MEAS_SAVE_EIS(2,"8:\meas","testeis1",0)	Saves the impedance data as file "testeis1"
MEAS_OPEN_CV(2,"8:\archive","cv1")	Loads the CV parameter set "cv1"
MEAS_CV	Starts cyclo-voltammogram measurement
MEAS_SAVE_CV(2,"8:\meas","testcv1",0)	Saves the CV data file
CLRSIM	Initializes the analysis software SIM
ANA_OPEN_EIS(2,"8:\meas","testeis1")	Loads the measurement file "testeis1" into the analysis software
ANA_OPEN_MOD(2,"8:\mods","model1")	Loads model file "model1"
ANA_FITEIS(100,100000,10)	Starts fit in the frequency range of 100 Hz to 100 kHz with a density of 10 points per decade
ANA_PLOT_EIS(1)	Plots impedance spectrum
ANA_OPEN_CV(2,"8:\meas","testcv1")	Loads CV measurement file "testcv1"
ANA_PLOT_CV(1)	Plots CV curve
SCRIPT_END	Script end

**AN
EXAMPLE
OF A
SCRIPT
APPLICATION**

... from the field of packing technology is described by Dr. Hollaender of the Fraunhofer Institute of Process Engineering and Packaging (FhIVV), Freising, Germany in the following contribution. The investigations focus on the quality of metallized foils and coatings of food containers. The AC/DC/AC methods developed by Dr. Hollaender run on an *IM6* system with **SCRIPT**. This method results directly in the delamination in millimeters. For this purpose, an impedance measurement (AC) is carried out first, then the sample is exposed to a cathodic loading (DC) and finally, another impedance spectrum (AC) is measured. The delamination is calculated automatically by comparing the two impedance spectra. A method which was rather complicated earlier, made room for a "push button" method which results in one single value, which is easy to interpret, by using **SCRIPT**.