RMC Boeckeler

QG-3100

TEM Stainer

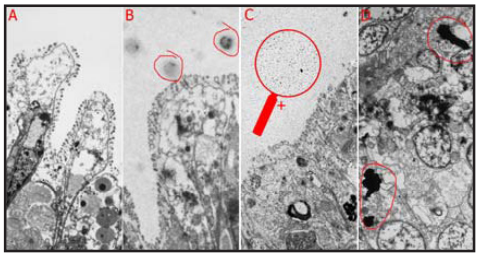
Fast
Reliable
Reproducible

While Minimizing..
Sample Contamination
Solution Waste

The Need

Since most organic materials produce only low-contrast results in transmission electron microscopy (TEM), staining procedures are needed to increase the image contrast.

Staining involves treatment with solutions that contain heavy metal salts (e.g. uranium, lead, osmium or tungsten), which attach to certain cellular components (peptides, lipids, nucleic acids etc.). These salts contain ions with a high number of protons. When the electron beam passes through a sample area decorated with such ions, it increases image contrast.



Epidermis of Phoronida, stained with lead citrate and uranyl acetate:
A) using TEM Stainer,
B) manual staining: precipitate of uranyl acetate
C) manual staining: of lead citrate
D) dust particles

Problems With Manual Staining

All TEM preparation procedures require very clean conditions, as even minor contaminations are visible in the high magnifications of the TEM.

Lead citrate solutions are very sensitive to exposure to carbon dioxide, because this results in a precipitation of fine particles of lead carbonate, which instantly damages the sample. Therefore, the staining process must exclude atmospheric air.

In many labs, TEM staining is accomplished by hand. The grids are placed on small drops of staining solutions and washed between and after staining steps. It is very difficult to avoid contamination. Many samples are discarded.

Processing grids by hand is also very time consuming, and the number of grids that can be stained simultaneously is limited. Furthermore, manual staining increases the risk of exposing the user to potentially harmful substances.

Solution: QG-3100

The QG-3100 automatic stainer increases both the staining quality and the yield by minimizing contamination, while saving time and reducing waste.

Through the unit's unique design, which uses a peristaltic pump and pinch valves, the solutions are isolated to the tubing and grid chamber. Liquids flow in only one direction. In addition to minimizing contamination, this design significantly reduces the time and waste associated with other techniques.

Open, Flexible Design

All components exposed to the staining solutions are easy to replace. Maintenance is simple and may be performed by the user. Extra input and output channels, freely programmable routines and an exchangeable grid chamber allows the realization of various laboratory tasks (e.g. graded ethanol series).

FEATURES

- Closed flow system provides clean conditions and exclusion of air
- Staining procedures are reliable and reproducible
- Exposure to staining solutions is minimized
- Extremely low operation costs
- Individual staining procedures may be easily configured
- Simple maintenance due to freely accessible tubing and valves

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SPECIFICATIONS

Staining costs (per staining)	
Lead citrate solution	Very low costs, since the user can buy these solutions in their raw form from any chemistry dealer. No expensive pre-packaged chemicals are required.
Uranyl acetate solution	
Waste (per staining, using default protocols)	
Waste lead citrate / H_2O	100 ml
Waste uranyl acetate / H_2O	100 ml
Waste HNO_3 / H_2O	200 ml
Processing times	
Wash cycle time	5 min + 5 min
Staining time (typ.)	60-90 min
Other	
Standard grid holder	40 grids
Staining times customizable	yes
Freely programmable staining and processing protocols	yes
Optional inputs for alternative staining/washing solutions	2
Handling	user interaction possible at any time, may continue program or switch to manual control of pump and valves
At end of processing:	chamber remains filled, grids immersed
Servicing	easily accessible tubing, servicing possible by user
Specifications	
Dimensions	18”(L) x 10”(W) x 14”(H) (Main Unit), 20”(L) x 25”(W) x 14”(H) (including bottles)
Weight	25lb (Main Unit), 40 lb (including bottle rack and empty bottles)
Power	100-240VAC, 60 amps, 36 watts

Björn Quast and Alexander Gruhl, two experienced TEM users at the Freie Universitaet Berlin, originally developed this device with a clear focus on the end user: ease-of-use and low costs of ownership

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