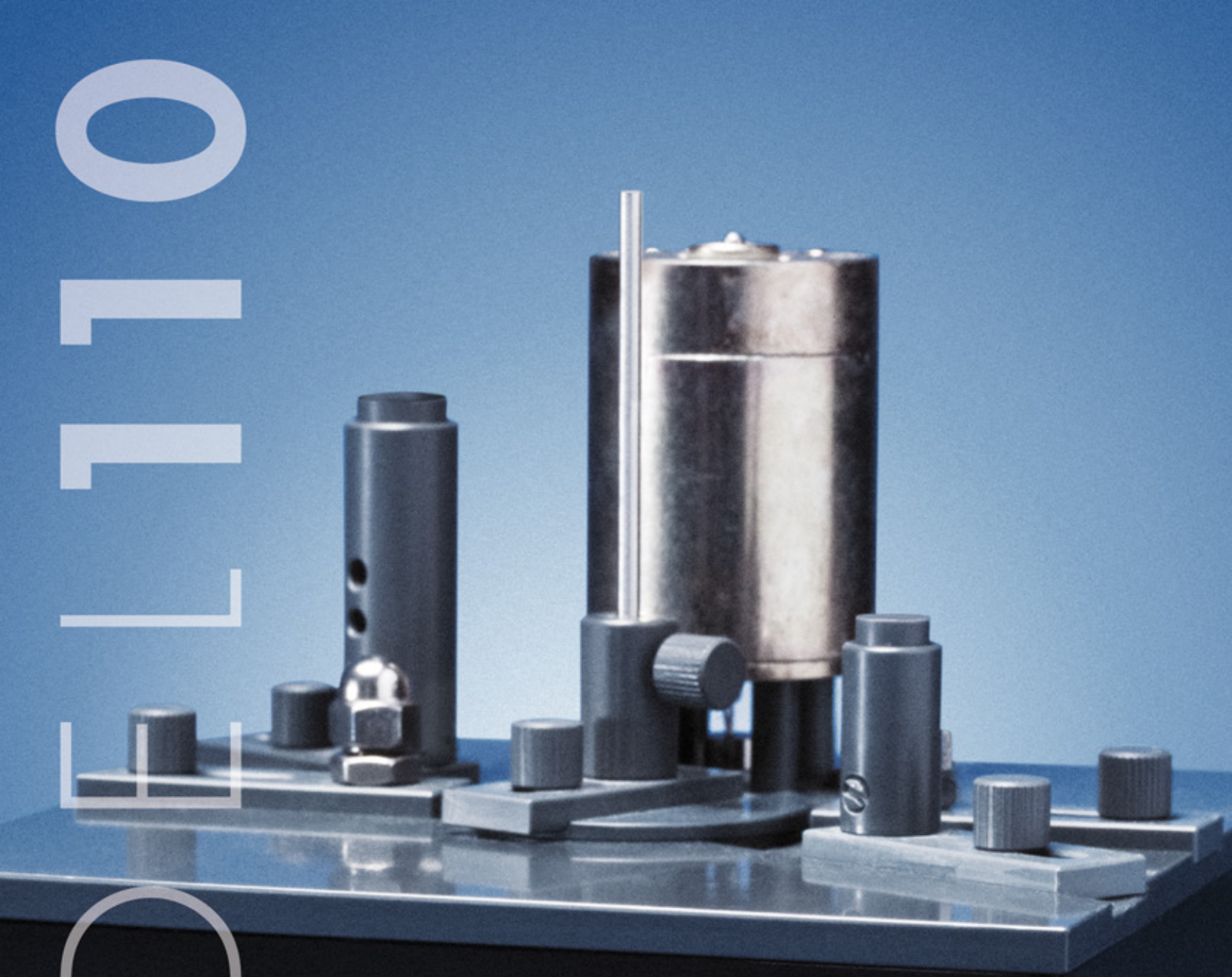
MODEL 110



Automatic Twin-Jet Electropolisher

The industry standard for producing high-quality thin foils for transmission electron microscopy

FISCHIONE INSTRUMENTS

ELECTROPOLISHING FOR TEM

Electrolytic thinning of conductive materials is an effective method of producing electron transparent foils for transmission electron microscopy (TEM). By electrochemically removing material, TEM specimens are made quickly and without any induced artifacts.

MODEL **110**

Automatic Twin-Jet Electropolisher

The Automatic Twin-Jet Electropolisher is used for the electrolytic thinning of TEM specimens. The twin-jet technique simultaneously polishes both sides of the specimen, creating electron transparency within a few minutes. Electrolyte flow and polishing voltage are controlled by either the Model 120 Automatic Power Control or the Model 140 Digital Power Control.

- **No induced artifacts**
- **Electrolytic polishing or chemical etching**
- **Easily adjustable**
- **Electrolyte resistant materials in the polishing cell**
- **Voltage and current can be continuously monitored**
- **Automatic process termination**
- **Audible and visual alarms are activated at perforation**
- **Audible and visual shutoff alarms**

Quick, easy electropolishing

Fischione's Model 110 Automatic Twin-Jet Electropolisher uses two jets to direct electrolyte flow onto the specimen, which simultaneously thins and polishes both sides.

Light is transmitted from a light source on the lid of the polishing cell through fiber optics and onto the specimen. Fiber optics on the opposite side of the specimen carry light to a photodetector.

Adjusting the sensitivity of the photodetector varies the detection threshold of the light transmitted through the specimen, effectively determining the size of the hole created. Audible and visual alarms are activated at the moment of perforation.

The variable flow rate pump works with the jet assemblies to provide a steady stream of electrolyte to the specimen. Cathode coils in the jet assemblies and the anodic platinum contact in the specimen holder allow current to flow through the electrolyte.

The polishing voltage and current can be adjusted at low levels to selectively dissolve metal ions from a specimen, that is, to chemically etch the specimen. Increasing the voltage until a plateau in current is reached results in electrolytic polishing. This electrochemical reaction dissolves metal ions uniformly at a controllable and reproducible rate.

Enclosed process

The polishing cell consists of the electrolyte pump and motor, jet assemblies, specimen holder, and fiber optic assemblies mounted on a PVC lid. The lid and its components fit into an acrylic box that holds a glass dish for the electrolyte.

The specimen holder is specifically designed so that the specimen can be easily installed with a single screw-on insert firmly securing the specimen in place.

Power Control Options

The electropolisher can be controlled by either the Model 120 Automatic Power Control or the Model 140 Digital Power Control.

Model 120 Automatic Power Control

The Model 120 Automatic Power Control provides complete electronic support for the electropolisher. It controls the electrolyte flow via the motor speed, polishing voltage circuit, light source, detection sensitivity, and photocell shutoff circuit, including audible and visual indicators.

Two analog meters indicate the polishing voltage and current levels. A switch selects whether or not current is applied, enabling either electropolishing or chemical etching. A single connecting cable links the power control to the electropolisher.

Intermetallic precipitates in thermally treated zircalloy-4. The electrolyte used was 20% perchloric acid, balance methanol, maintained at a temperature of -40 °C. Voltage was adjusted to allow a current range of 35 to 45 mA.

Image courtesy of J. J. Haugh, Westinghouse Electric Corporation, U.S.A.

Model 140 Digital Power Control

The Model 140 Digital Power Control is specifically designed for use with the Model 110 Twin-Jet Electropolisher. It controls the electrolyte flow, the polishing voltage and current, the light source and photodetector shutoff circuit, and both visual and audible alarms. Digital displays allow precise setting and monitoring of the electropolishing voltage and current levels.

The photodetector circuitry detects the first sign of light penetration through the specimen and activates both audible and visual alarms, independent of the position of the pump and polish switches.

A switch activates current flow and controls the light source. The amount of light required to activate the photodetector shutoff can be adjusted to control the perforation size in the specimen.

LEDs indicate which mode of operation is active.

Pump Auto mode. Stops the electrolyte flow when light penetrates the specimen.

Pump Continuous mode. Pump remains activated after light has penetrated the specimen and the photocell circuitry has activated the alarms. This feature allows polishing to be extended past the point of a small perforation in the specimen.

Polish Auto mode. Stops the polishing current when light penetrates the specimen.

Polish Continuous mode. The voltage remains activated after light has penetrated the specimen, allowing for continuous polishing while the switch is on.

At any time during an alarm condition, the audible alarm can be silenced. The alarm indication light remains illuminated.

Model 120 Automatic Power Control

Model 140 Digital Power Control

Model 130 Specimen Punch prepares high-quality disk specimens.

Model 220 Low Temp Container for low temperature polishing.

Optional accessories

Fischione recommends the following Fischione products that complement the Model 110 Automatic Twin-Jet Electropolisher.

Model 130 Specimen Punch

A precision ground punch and die plate eliminate specimen stress and distortion. For convenient handling, a spring-loaded return plunger keeps the disk specimen on the die plate surface.

Model 220 Low Temp Container

Use the Low Temp Container with the Model 110 Twin-Jet Electropolisher for applications at cryogenic temperatures. The electrolyte contained in the glass dish is cooled via conduction from a cooling medium such as liquid nitrogen and methanol.

Double wall, heavily insulated construction maintains temperature throughout the electropolishing process. A hole in the top plate provides access for a thermometer or thermocouple.

Manufactured entirely from electrolyte resistant materials.

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