

Betzmann Galvanik

Black Ruthenium

Black Ruthenium Plating Guide for Beginners

Brush, Tampon & Bath Plating

This guide is beginner-friendly, practical, and aligned with international training standards and. It applies to selective decorative brush plating as well as tampon and bath plating.

Black ruthenium produces hard-wearing, dark, glossy decorative coatings and is widely used as a premium alternative to black rhodium or black chrome.

1. What Is Black Ruthenium Plating?

Black ruthenium plating is an electrochemical process that deposits a dark gray to deep black, glossy ruthenium layer. The final color is voltage-dependent.

2. Electrolyte & Coating Properties

- Metal content: approx. 2 g Ru / 100 ml (ready-to-use)
- Deposition rate: up to $\sim 0.08 \mu\text{m}/\text{min}$
- High covering power
- Abrasion-resistant and color-stable

Typical deposition rates:

- $\sim 0.03 \mu\text{m}/\text{min}$ at 8 V
 - $\sim 0.05 \mu\text{m}/\text{min}$ at 10 V
 - $\sim 0.08 \mu\text{m}/\text{min}$ at 12 V
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3. Suitable Substrates

- Copper
 - Nickel
 - Gold (recommended as final underlayer)
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4. Safety

- ⚠ Electrolyte is strongly acidic
 - Wear rubber protective gloves
 - Wear safety goggles
 - Avoid skin and eye contact
 - Ensure adequate ventilation
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5. Operating Parameters

- Operating temperature: approx. 40–50 °C
- Voltage: 4–10 V (max. 12 V)

⚠ Color control:

- lower voltage → darker black tone
 - higher voltage → lighter anthracite tone
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6. Electrical Setup

- Positive (+): handpiece with anode and pad
- Negative (-): workpiece with crocodile clip

Electrodes:

- Platinum anode (preferred)
 - Graphite anode (alternative)
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7. Surface Preparation

1. Polish surface to high gloss
2. Degrease → rinse with water
3. Activate steel or nickel → rinse
4. Copper, nickel, or gold plate → rinse
5. Etch gold layer and negative clip with 10% sulfuric acid (1–2 min)
6. Rinse with distilled water

8. Brush / Tampon Black Ruthenium Plating

- Heat electrolyte to $\sim 40^\circ\text{C}$
- Fully soak pad and keep it wet
- Start plating at $\sim 4\text{ V}$
- Use smooth, circular movements
- Adjust voltage for desired color

9. Bath Plating

- Position workpiece centrally
- Use platinum or graphite anodes
- Maintain constant temperature
- Increase voltage slowly

10. Rinsing & Finishing

- Rinse only with distilled water
- Polish with microfiber cloth and care product
- No drying time required

11. Common Beginner Issues

- Too light color \rightarrow voltage too high
- Poor adhesion \rightarrow insufficient etching
- Patchy coating \rightarrow pad too dry or uneven movement

Summary:

Black ruthenium offers a durable, elegant dark finish – precise preparation, temperature control, and voltage adjustment are key to success.