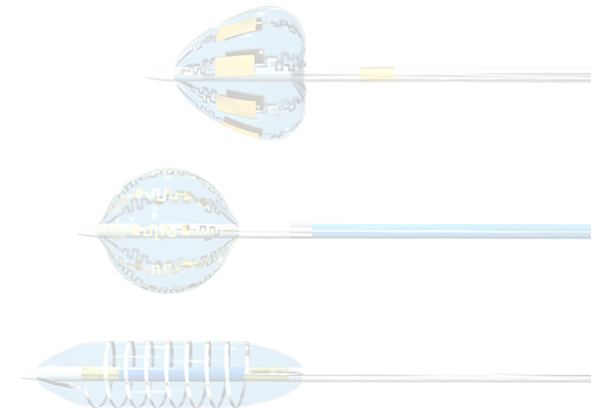
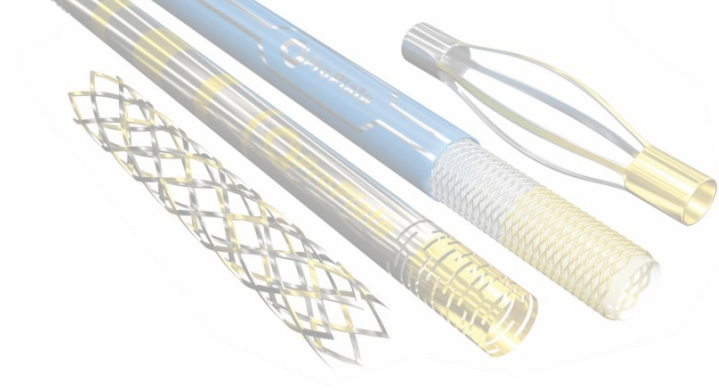


ProPlate® helps medical device engineering leaders develop innovations through unique metal coating technologies that drive commercial success and result in improved patient outcomes.

- **Selective Plating**
- **Polymer Metallization**
- **Engineering & Design Expertise**
- **Process Development & Management**



ProPlate®
Engineered Metal Coating Solutions





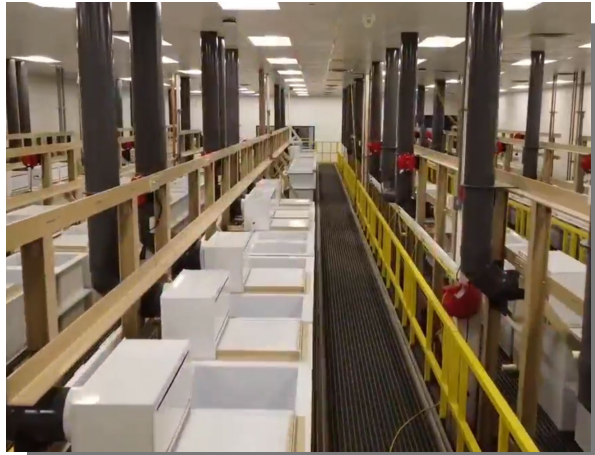
History

- Founded in 1984
- Present Ownership Since 1997
- ISO 13485:2016 Certified





Locations



- Anoka, Minnesota - West Facility
 - 38,500 ft² - (3,600 m²)
 - ISO 13485:2016 Certified
 - IQ, OQ, PQ Protocol Execution
 - In-House Chemistry Lab
 - Industry Standard Inspection & Testing



- Anoka, Minnesota - East Facility
 - 12,000 ft² - (1,100 m²)
 - ISO 13485:2016 Certified
 - IQ, OQ, PQ Protocol Execution
 - In-House Chemistry Lab
 - Industry Standard Inspection & Testing



Our Core Values



Quality Minded - Has the expectation of themselves and others for quality outcomes



Driven – Self-starter, takes initiative, motivated, doesn't need to task



Reputable - Honesty, integrity, dependability, accountability



Innovative - Creates innovation or embraces it



Collaborative - Works with others, team player

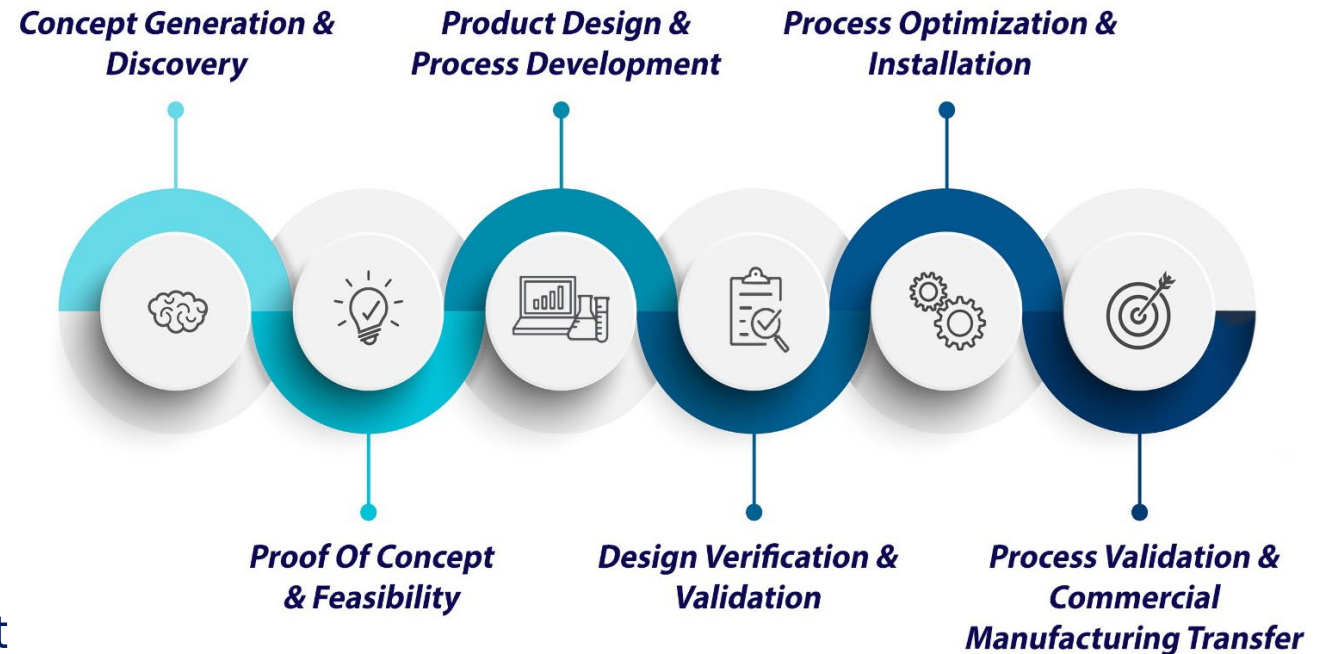


Exceptional Thinking - Critical thinking skills, independent thinker



Quality

- ISO 13485:2016 certified
- Regulatory Compliance
- IQ, OQ, PQ Validation Protocols
- Risk Based Approach
- Industry Standard Inspection & Testing
- Internal Analytical Chemistry Lab
- Programmed software ensures consistent conditions of > 300 plating baths
- Automated material handling & processing





Markets

Neurovascular

Stent Retrievers
Flow Diversion
Aneurysm Coils
Carotid Stents
Aspiration Catheters
Balloon Occlusion Catheters
Microcatheters
Guidewires
Delivery Systems

Electrophysiology

Pulsed Field Ablation
RF Ablation
Cryoablation
Diagnostic & Mapping Catheters
Transeptal Access Catheters

Structural Heart

TAVR
TMVR
LAA
Embolic Protection Devices
Guidewires
Introducers
Delivery Systems

Peripheral Vascular

Atherectomy
Intravascular Lithotripsy
Renal Denervation
Thrombectomy
Stents
CTO Devices
Vascular Closure
Catheters
Guidewires

Heart Failure

LVAD
pVAD
ADHF Devices

Biosensors

Insulin Pumps
Continuous Glucose Monitoring
Biowearables

Surgical Robotics

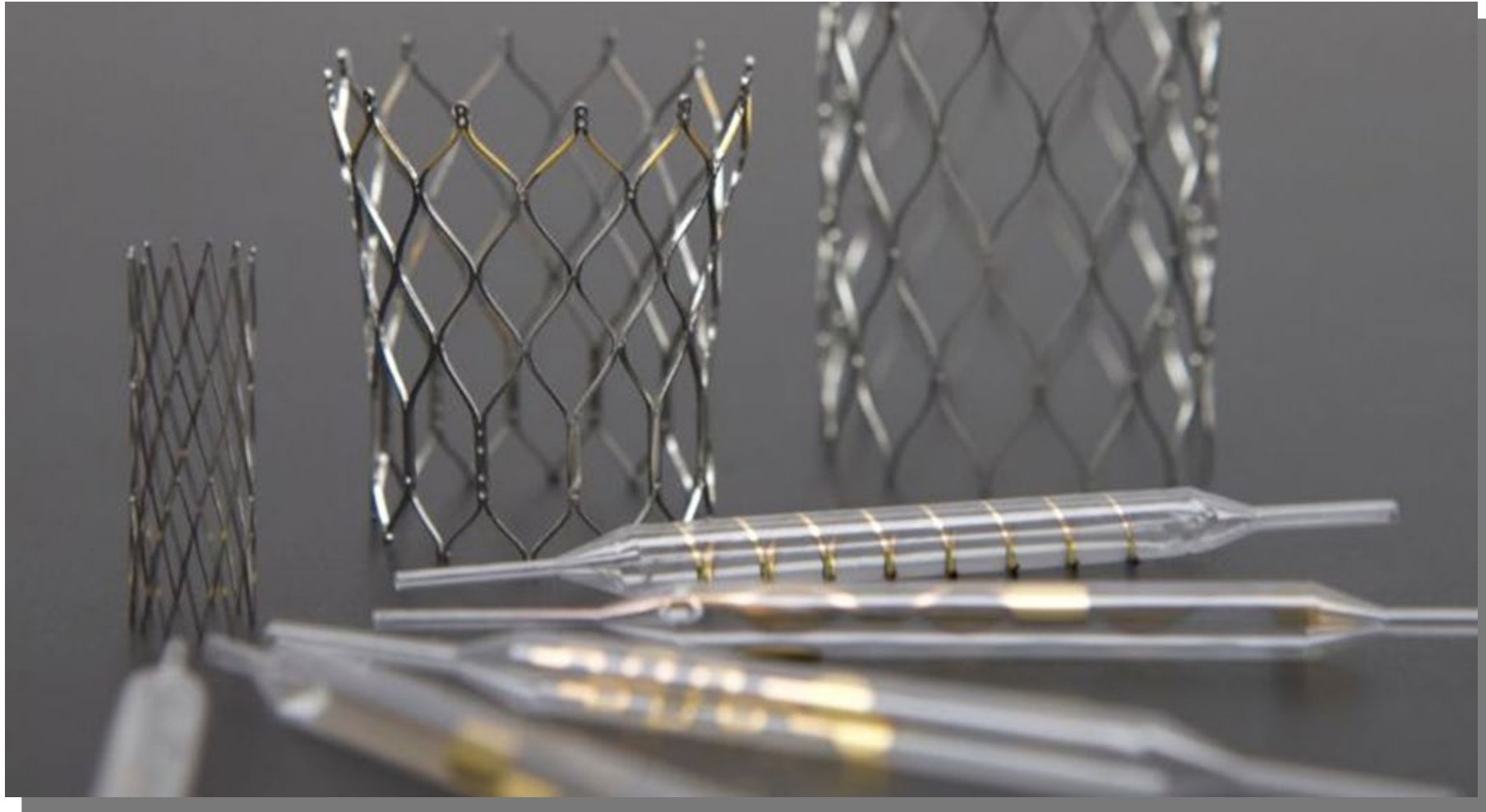
Instruments
Stapling
Energy
Forceps
Tissue Markers
Magnetic Navigation

Dental & Orthodontics

Orthodontic Arch Wires
Orthodontic Brackets



Capabilities



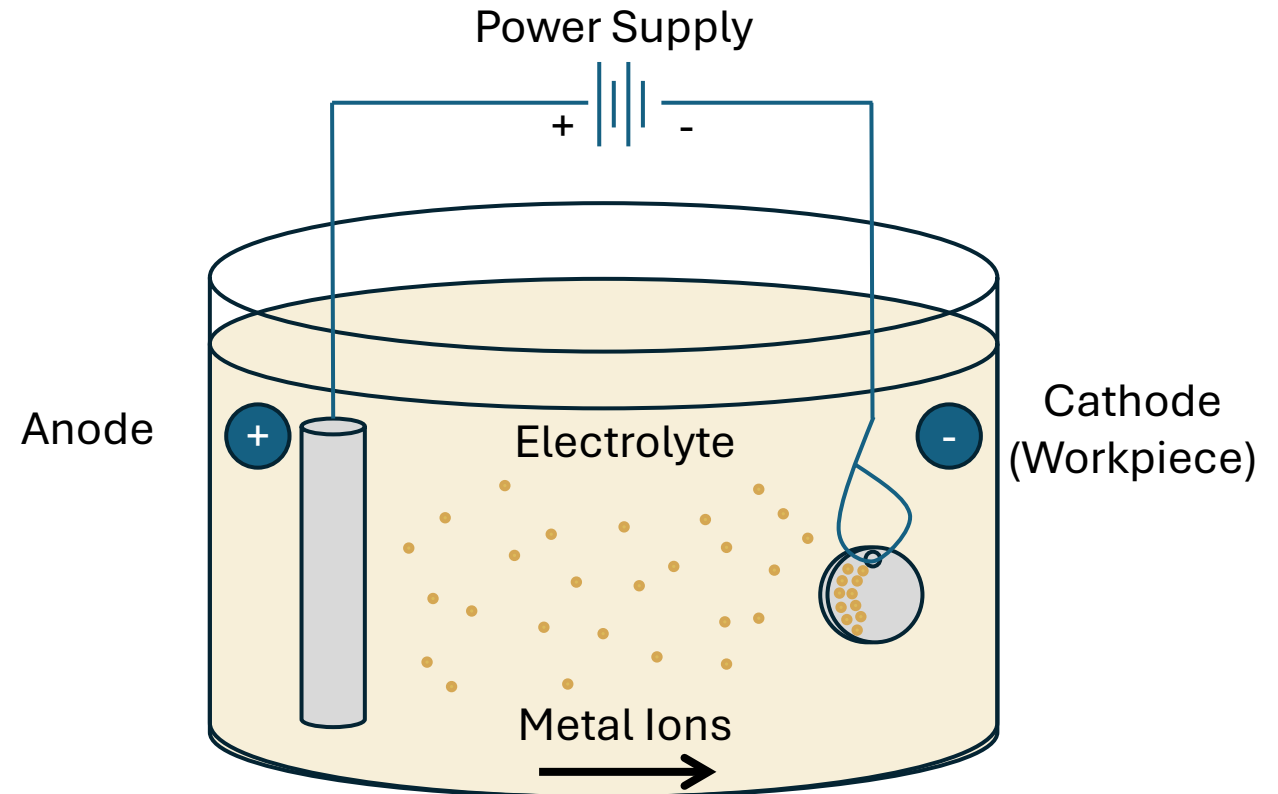


Electroplating Process Overview

Electroplating

(also known as electrochemical deposition or electrodeposition)

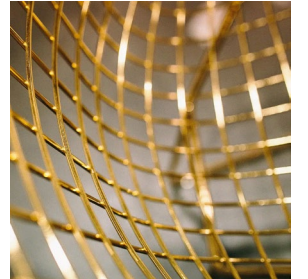
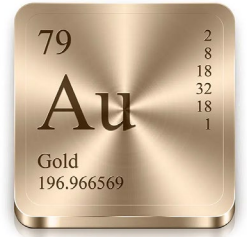
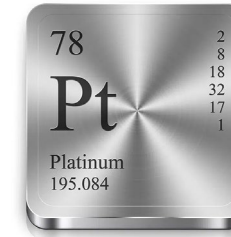
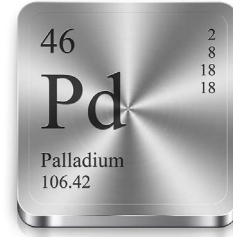
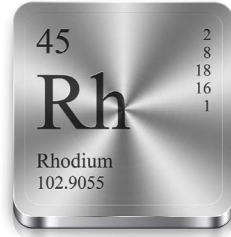
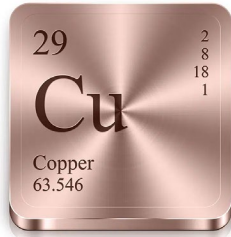
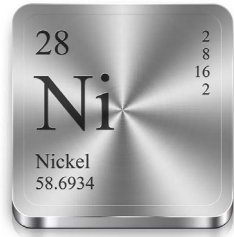
- A process for producing a metal coating on a solid substrate
- reduction of cations of metal by a direct electric current
- The part to be coated acts as the cathode (negative electrode) of an electrolytic cell
- the electrolyte is a solution of a salt of the metal to be coated
- the anode (positive electrode) is usually either a block of that metal, or of some inert conductive material





Metal Finishes

Material Properties



Density (g/cm³)

8.9

8.9

12.4

12.0

10.5

21.4

19.3

Electrical Conductivity
(S/m x 10⁶)

14.3

58

23

10

63

9

41

Thermal Conductivity
(W/mK)

90.7

401

150

71.8

429

71.6

317

Young's Modulus (Gpa)

205

120

275

170

83

172

79



Marker Bands & Electrodes Electroplated Platinum and/or Gold

- Radiopaque
- Permanently Adhered — Atomically Bonded
- Non-Toxic / Biocompatible — Pure Materials
- Facilitates Complex Geometry
- Enables Selective Insulation
- Improves Weldability
- Cost Saving Alternative to Traditional Marker Bands & Electrodes
 - Lower Precious Metal Consumption
 - Decreased Manufacturing Costs





Pull Ring Assemblies

Electroplated Platinum and/or Gold

- Radiopaque
- Permanently Adhered — Atomically Bonded
- Non-Toxic / Biocompatible — Pure Materials
- Improves Weldability
- Plating Options:
 - Selectively plate entire assembly
 - Plate loose rings prior to welding wire
- Simplifies manufacturing sequence and increases design freedom
- Improves assembly reliability while maintaining performance





Vizi-Band® Selective Radiopaque Coating

- Permanently Adhered — Atomically Bonded
- Non-Toxic / Biocompatible — Pure Materials
- Nitinol Maintains Shape Memory — Low Thermal Process
- Lower Device Profile — Reduced Marker Thickness
- Facilitates Complex Geometry
- Improves Component Flexibility — Strategic Marker Placement & Shape, Ductility

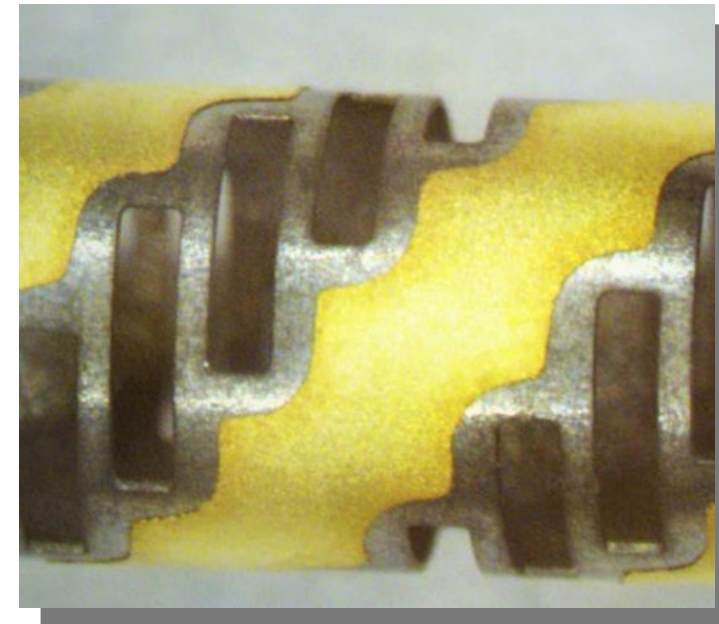
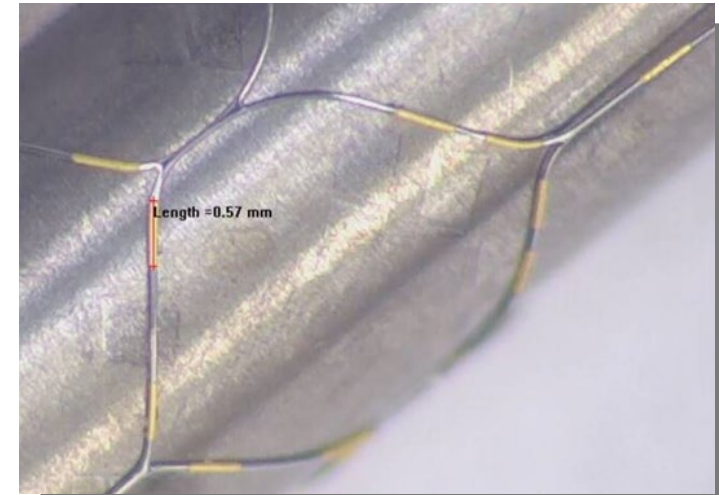




Vizi-Band®

Selective Radiopaque Coating

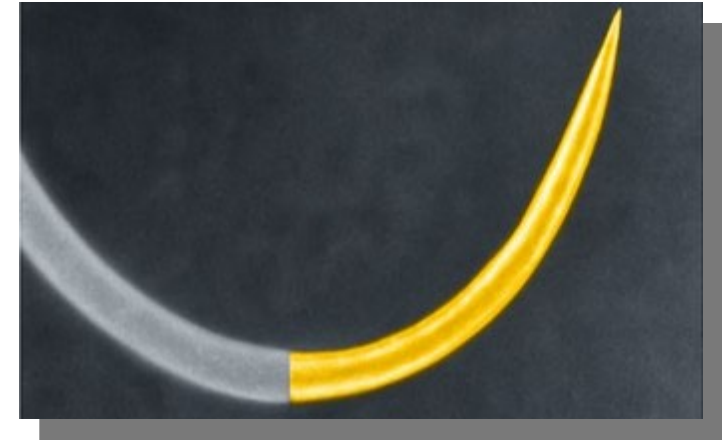
- Custom Shapes and Marker/Electrode Dimensions
 - Minimum Feature Sizes: <0.010" (0.25 mm)
 - Non-Circumferential Markers
 - Allows for improved mechanical flexibility
 - Enables Device Orientation & Location
- Accurate Position Tolerancing & Crisp Edges
 - Tolerances Held +/- .005" (0.127 mm)
 - Enables Installation in challenging miniature areas
- Tailored Coatings Thicknesses & RO Brightness
 - Typical Coating Thicknesses: 200-800 μ in (0.005 – 0.02 mm)
 - Advantages of Additive Manufacturing
 - Reduced Profile Compared to Traditional Markers (>1,000 μ in)
 - Comparable Radiopacity Visibility





Gold Plated Needles Shape Setting Post Plating

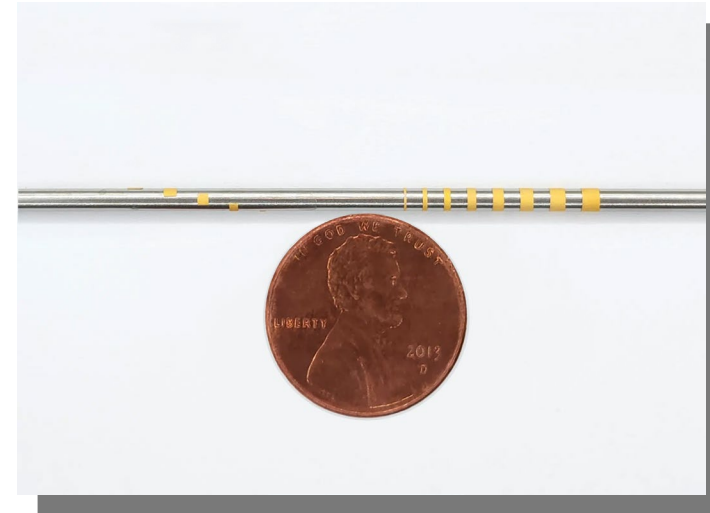
- **Biocompatible:** Inert and implant safe
- **Radiopaque:** Enhanced X-Ray/Fluoro visibility
- Adhesion maintained during shape setting
- Corrosion-resistant for long-term use
- Post-process grinding to a fine point tip with no adverse effects on the gold plating.





Vizi-Band®

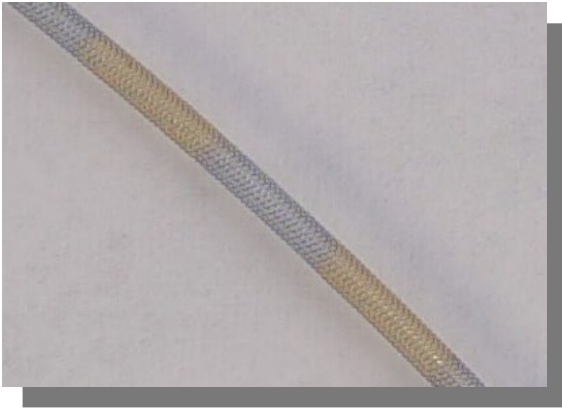
Selective Radiopaque Coating



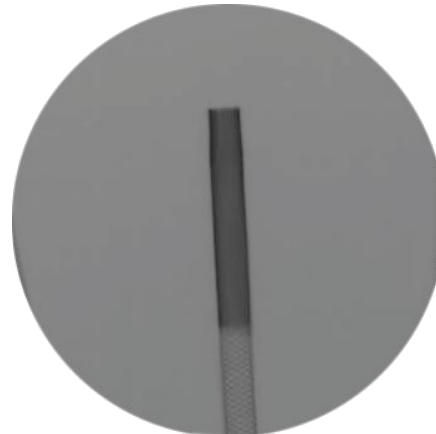


Vizi-Band[®]

Braided Shafts



Gold (Au) Vizi-Band[®]
enhancing radiopacity



Gold (Au) Vizi-Band[®] Distal
Stainless-Steel Braid



Nickel (Ni) Vizi-Band[®]
locking all intersecting
braid members



Meta-Poly®

Selective Metallization of Polymers

- Selective Metallizing Process — Vacuum Deposition
- Designed for Flexible — Thin-Walled Medical Polymers
- Non-Toxic / Biocompatible — Medical Grade Materials
- Atomic Bonding — Superior to Mechanical Bonds
- Low Thermal Process — Does Not Degrade Polymers
- Common Applications:
 - Ablation
 - Mapping
 - Sensing
 - Stimulation

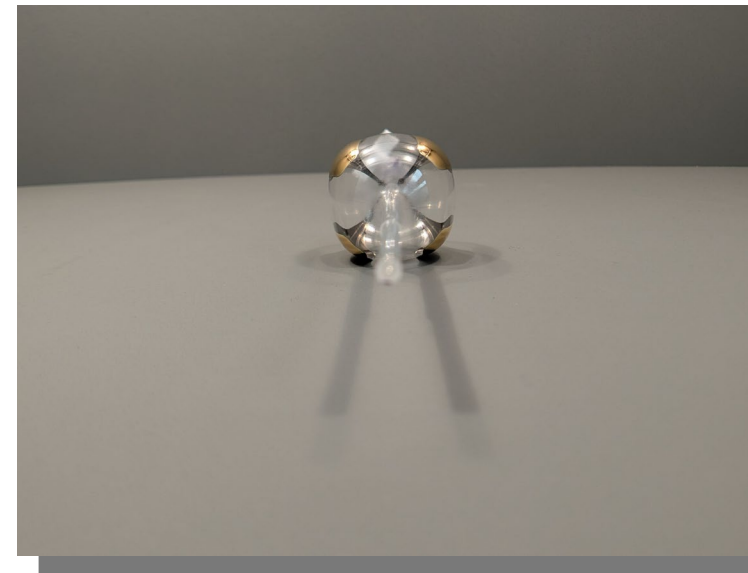
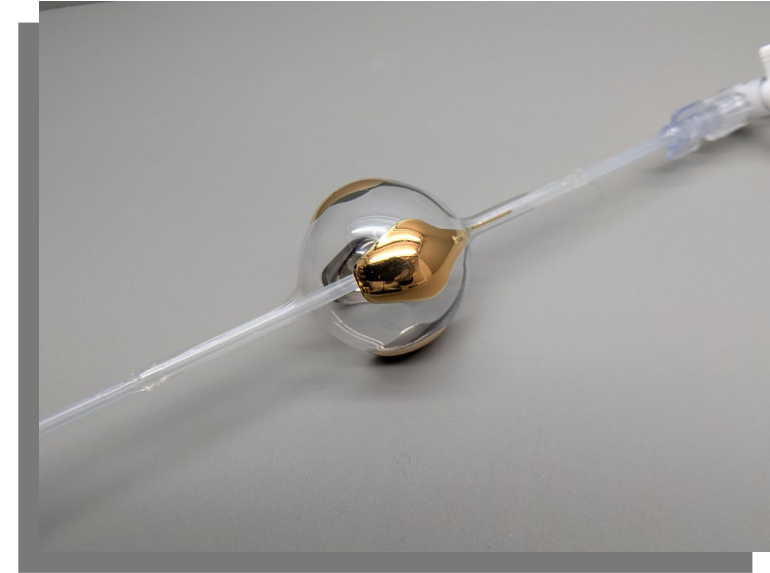




Meta-Poly®

Selective Metallization of Polymers

- Typical Polymers Metallized
 - PET, Urethane, PEBAX, Nylon, & other Medical Polymers
- Flexible Design Capabilities
 - Custom Design Shapes and Circuitry Dimensions
 - *Minimum Feature Sizes: ~ 0.02" (0.5mm)*
 - Tailored Metal Layers & Coatings Thicknesses
 - *Coating Thicknesses: ~20-400 u" (0.5-10 microns)*
- Superior Electrode Integrity
 - Excellent Adhesion Properties
 - *Passes ASTM Peel Tape Adhesion Tests*
 - Excellent Corrosion Resistance
 - *Passes Accelerated Saline Soak Test*
 - Excellent Malleability
 - *Metallized Areas can Expand, Stretch, Fold & be Manipulated While Maintaining Desirable Plasticity (without delamination)*





Meta-Poly®

Inflation & Deflation



<https://www.youtube.com/watch?v=h0BLDqSFI58>



Meta-Poly®

Insertion & Retraction



<https://www.youtube.com/watch?v=uwBY9hZzF7I>



Magnet Plating

Rare Earth Magnets

- Hermetically Sealed Coating
- Non-Toxic / Biocompatible Coating — Medical Grade Materials
- Atomic Bonding — Superior to Mechanical Bonds
- Radiopaque Coating
- Evenly Deposited & Pore Free Coating
- Enables use of rare earth magnets without Traditional Encapsulation
- Passes 72-hour saline soak — 50 degrees Celsius
- Magnet Materials
 - Neodymium Iron Boron (NdFeB)
 - Samarium Cobalt (SmCo)

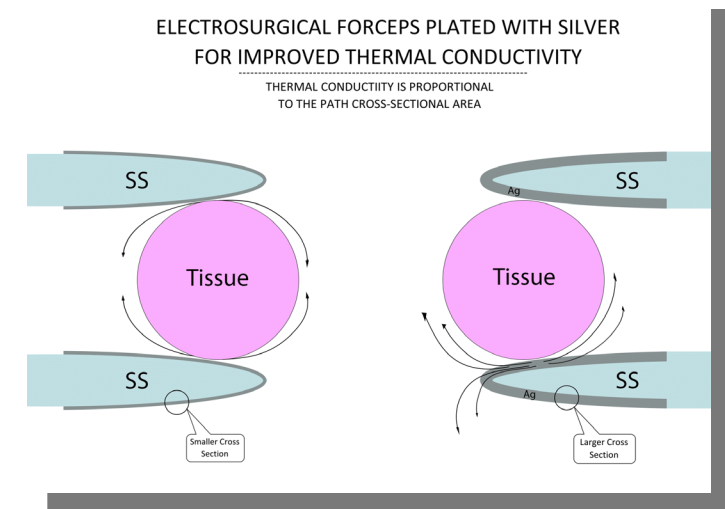




Medical Silver Plating

General Applications

- **Electrosurgical Instruments** – forceps, scissors, lades, electrodes
- **Surgical Robotics** – precision tools requiring high conductivity, non-stick surfaces, & repeatable performance
- **Bipolar Forceps Plating:** Electrosurgical tool designed to coagulate tissue with current
 - High thermal & electrical conductivity
 - Reliable performance in surgical use
 - Non-stick effect reduces tissue adhesion
 - Efficient coagulation & ablation
 - Durability for repeated use





Thank You



Anoka, MN



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