

MULTIMETAL DEPOSITION METHOD  
FOR  
LATENT FINGERPRINT DEVELOPMENT  
BY  
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ATTRIBUTES OF THE METHOD

Incorporates principles of both small particle and physical development in a single easy procedure.

Uses stable commercially available reagents or reagents can easily be made. Develops prints on many surfaces and materials.

(Porous/Non-Porous)

- FLOPPY DISK SURFACES
- ADHESIVE/SMOOTH TAPE SURFACES (ANY COLOR INCLUDING BLACK)
- METALS
- WET/DRY PAPER (EVEN BLACK)
- SOME STYROFOAM SURFACES (FOOD CONTAINERS)
- CREDIT CARDS
- GLASS

MORE ATTRIBUTES

Can be used after other techniques have been tried. (Such as Ninhydrin, provided Zinc Chloride is not used.) Developed prints are permanent on porous items and chemical fixer may be applied to non-porous items. Porous and non-porous items are easily photographed.

Prints can be first transferred from surfaces and paper to a nitrocellulose membrane and then developed. First case "MADE" on 3/22/89 by FSD/USSS. Several others since.

PRINCIPLES OF THE MULTIMETAL TECHNIQUE

1. Colloidal gold at a pH of approximately 3.0 binds to Amino Acids, Peptides, and Proteins in the deposited print. Many times usable prints can be seen after the gold incubation step.
2. The bound colloidal gold provides a nucleation site around which silver precipitates in the second incubation step. This step greatly amplifies the visibility of the print.

## PREPARATION OF COLLOIDAL GOLD

1. Prepare a 10% W/V\* solution of Tetrachloroauric Acid (Gold Chloride) in high quality distilled water. This solution is stable indefinitely, and can be stored at room temperature.
2. Prepare a 1% W/V solution of Sodium Citrate in distilled water. This solution is stable indefinitely and can be stored at room temperature.
3. To one liter of distilled water add one ml of the stock gold solution. Bring to a gentle but continuous boil.
4. Add 10 ml of stock Sodium Citrate solution. Continue to boil gently for 15 minutes (should be a port wine color).
5. Turn off heat source. When boiling stops, stir in 5 ml of Tween 20. Cool.
6. Restore volume to 1 liter with distilled water. Some water is lost during heating and boiling.
7. Adjust pH to approximately 3.0 with 0.5M\* Citric Acid (usually about 1 ml is required).
8. Store in scrupulously clean glass or plastic container in refrigerator. Stable for several months.

## PREPARATION OF MODIFIED PD SOLUTION

### SOLUTION A - REDOX, PER LITER

33 gm	-	FERRIC NITRATE
89 gm	-	FERROUS AMMONIUM SULFATE
22 gm	-	CITRIC ACID

1 liter of distilled water (dissolve the above chemicals completely from top to bottom; appears to be stable indefinitely at room temperature).

### SOLUTION B - DETERGENT

2.7 gm	-	N-DODECYLAMINE ACETATE
4. gm	-	SYNPERONIC - N*

1 liter distilled water (dissolve the above chemicals completely).

### SOLUTION C - SILVER NITRATE

20 gm	-	SILVER NITRATE
100 gm	-	DISTILLED WATER

(store in a dark container at room temperature)

### TO MAKE THE MODIFIED PD SOLUTION MIX:

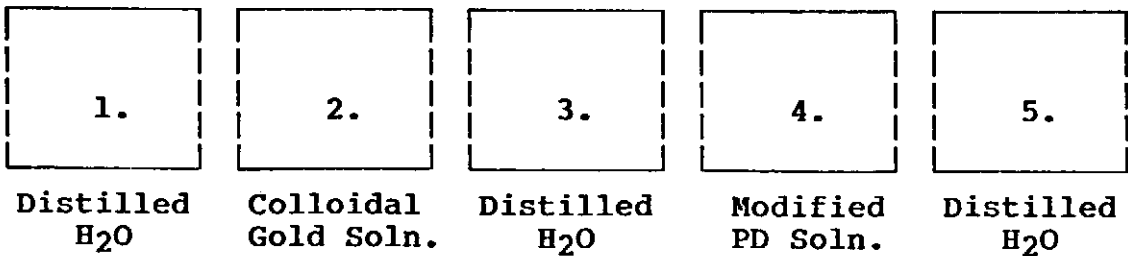
100 ml	-	SOLUTION A
1 ml	-	SOLUTION B
1 ml	-	SOLUTION C

\* - See Appendix

GENERAL PROCEDURE

1. If item is paper, soak in several changes of distilled water for 20 - 30 minutes. Don't use Maleic Acid.
2. Incubate suspect item with colloidal gold solution for 30 - 120 minutes. Agitating item gently hastens processing.
3. Rinse item in distilled water. For paper - rinse in several changes of distilled water for 15 minutes.
4. Incubate item in silver developer (a modified PD solution) until adequate contrast is visualized between the latent print and its background.
5. Thoroughly rinse in distilled water.
6. Air or blow dry and photograph.

TRAY SET UP



(fill to  
cover item)

GENTLE AGITATION IN ALL BATHS WILL HASTEN PROCESSING

## MULTIMETAL CHEMICAL LIST

GOLD CHLORIDE ACS Reagent No. G4022 Sigma Chemical Co.	5 gm	\$130.30
SILVER NITRATE (crystals) No. S 181-25 Fisher Scientific	25 gm	\$ 43.75
TWEEN 20 No. BP 337-500 Fisher Scientific	500 ml	\$ 7.00
SODIUM CITRATE No. S279-500 Fisher Scientific	500 gm	\$ 17.50
CITRIC ACID MONOHYDRATE No. A104-500 Fisher Scientific	500 gm	\$ 20.90
FERRIC NITRATE (crystals) AR No. I110-500 Fisher Scientific	500 gm	\$ 28.95
FERROUS AMMONIUM SULFATE (crystals) AR No. I77-500 Fisher Scientific	500 gm	\$ 51.75
CITRIC ACID ANHYDROUS No. A940-500 Fisher Scientific	500 gm	\$ 19.55
N-DODECYLAMINE ACETATE No. 209677 ICN Biomedicals, Inc.	100 gm	\$ 34.50
SYNPERONIC - N No. 1-2726 Lightning Powder Co.	60 ml	\$ 7.95

## MANUFACTURER LIST

FISHER SCIENTIFIC Corporate Headquarters 711 Forbes Avenue Pittsburgh, PA 15219	-	1-(412) 562-8300
K & K LABORATORIES Division of ICN Biomedicals, Inc. Cleveland, Ohio 44128	-	1-(216) 831-3000
LIGHTNING POWDER CO. 1230 Hoyt Street, S.E. Salem, Oregon 97302	-	1-(800) 852-0300
SIGMA CHEMICAL CO. P.O. Box 626 St. Louis, MO 63178	-	1-(800) 325-3010

## APPENDIX

- W / V - Weight per Volume Ratio
- EXAMPLE: A 10% W/V solution of Tetrachloroauric Acid (Gold Chloride) is 1 gm Gold Chloride sized with 10 ml Distilled water.
- EXAMPLE: A 1% W/V solution of Sodium Citrate is 1 gm Sodium Citrate dissolved in 100 ml Distilled water.
- m - The molar concentration of a solute, usually expressed as the number of moles of a solute per liter of solution.
- EXAMPLE: We use Citric Acid Monohydrate (any Citric Acid will do) which has a F.W. (Formula Weight) of 210.14 gm per 1 liter of distilled water. Our Citric Acid solution requires a 0.5 M which is 1/2 the F.W. which equals 105.07 gm per 1 liter of distilled water.
- To make 100 ml of this solution use:  
10.5 gm Citric Acid Monohydrate  
100 ml Distilled water

$$1 \text{ gm} = 1 \text{ ml}$$