

Electrohydrodynamic jet printing system for pattern of micro conductive line

*Y. S. Shin, D.Y. Lee, S.E. Park, S.Y. Kim, #J. Hwang(hwangjh@yonsei.ac.kr)

Key words : Electrohydrodynamic, Electrohydrodynamic jet printing, Jet printing, micro conductive line

1. PDP TV, Note PC, LCD TV, (PCB), Gas, CPU, PCB, (interconnection density) 50 μm, 100 μm, (feature size) PCB, LCD (liquid crystal display), PDP (plasma display panel) (thick film process) (thin film process) (mask) (photo resist) (exposure), (development), (etching) LCD, PDP

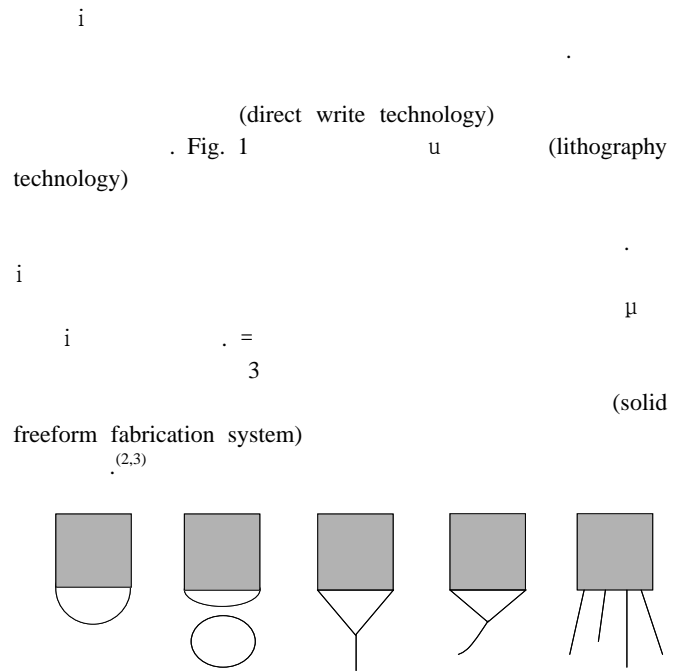


Fig. 2 No dripping, dripping, cone-jet, unstable cone-jet, multi jet (unstable)

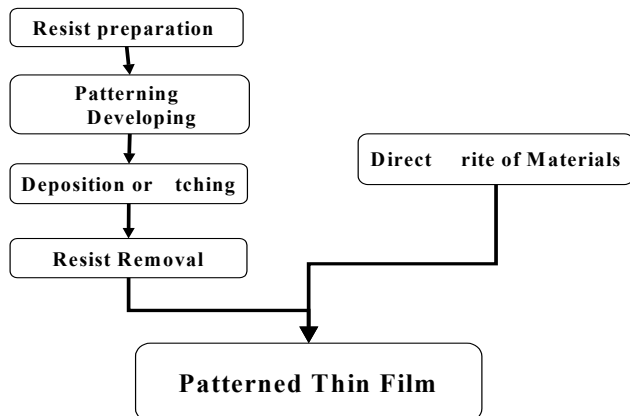


Fig. 1 Direct write and lithography technology

◦ (monodisperse)

=

2

.6 i

(7,8)

(cone-jet)

(ground pin electrode)

Pin-Pin type

2. n

(electrohydrodynamic jet printing)

Pin-Pin type

4

(syringe Pump),

Fig 3

(guide ring)

Pin-Pin type

(ground electrode)

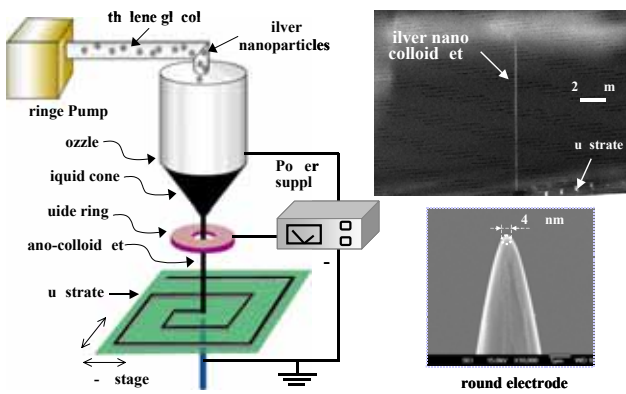


Fig. 3 Schematic of the electrohydrodynamic printing

k

3. n

Fig. 4

(Pin-Pin type)

. 150 μm ~ 200 μm

2

10cm

=

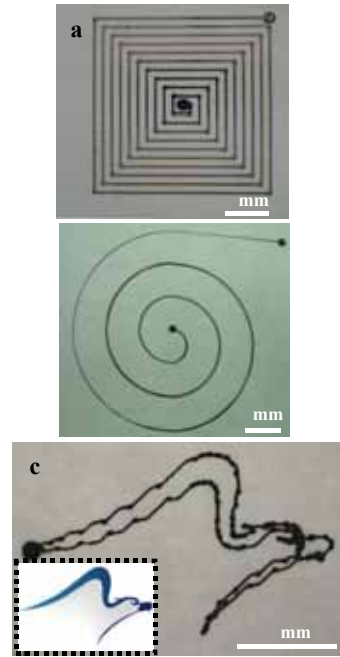


Fig 4. Square-shape pattern (a) round-shape pattern (b) and one of the logos of Yonsei University (c) formed by electrohydrodynamic printing of silver nanoparticles

1. Pique, A. and Chrisey, D. B., 2002, "Direct Write Technologies for Rapid Prototyping Applications," *cad mic ss*, San Diego.
2. Church, K. H., Fore, C. and Feeley, T., "Commercial Applications and Review for Direct Write Technologies," *Ma ia s ac ci m si m c di g*, Vol. 624, pp. 3~8., 2000.
3. Chrisey, D. B., "Materials Processing - The Power of Direct Writing," *ci c*, Vol. 289, pp. 879~881, 2000.
4. Ragucci, R., Fabiani, F., Cavaliere, A., Muscetta, P. and Noviello, C., "Characterization of Stability Regimes of Electrohydrodynamically Enhanced Atomization," *Ex im a T ma a d id ci c*, Vol. 21, pp. 156~161, 2000.
5. Lee, J. B. and Hwang, J., "Electrohydrodynamic Characteristic of an Electro-Spray System," *T a s f ME*, Vol. 23, No. 8, pp. 1031~1039, 1999.
6. Lefebvre, A. H., "Atomization and Sprays," *mis b is i g a i*, Chap. 2, pp. 37~39, 1989.
7. Jayasinghe, S. N., Edirisinghe, M. J. and Wilde, T. D., "A Novel Ceramic Printing Technique Based on Electrostatic Atomization of a Suspension," *Ma ia s a c a i*, Vol. 6, pp. 92~95, 2002.
8. Jayasinghe, S. N. and Edirisinghe, M. J., "Effect of Viscosity on the Size of Relics Produced by Electrostatic Atomization," *s ci c*, Vol. 33, pp. 1379~1388, 2002.
9. Lee, D. Y., Shin, Y. S., Park, S. E., Yu, T. U., and Hwang, J., "Electrohydrodynamic Printing of Silver Nanoparticles by Using a Focused Nano-Colloid Jet", *Applied Physics Letters*, Vol. 90, 081905, 2007.