

Piezotech FC™ ink H

- Processing guide –

Technical Data

Technology	Solvent casting / spin coating	Thickness range (μm)	Doctor blade: 3 – 80 Spin-coating: 5 - 20
Bas polymer	Piezotech FC 25	Viscosity (mPa.s)	2300
Curie Temp. (°C)	112 - 123	Base Solvent(s)	MEK
Melting Temp. (°C)	150	Typical dry content value (%)	20
Annealing Temp. (°C)	135	Boiling Point (°C)	78 - 82

Printing Data

Thanks to the high purity of the ink, devices obtained with Piezotech FC ink H provide easy evaporation of the solvent and uniform thickness of the film.

Precautions

- Substrate cleaning is a key point to obtain a high quality film. It is possible to use solvents as acetones, ethanol and complete it with a 3mn UV ozone treatment
- In order to avoid bubbles, it is preferable to not use syringe
- For spin-coating, Drop casting slowly the ink in all substrate surface before rotation is a good way to provide good film quality and good thickness uniformity

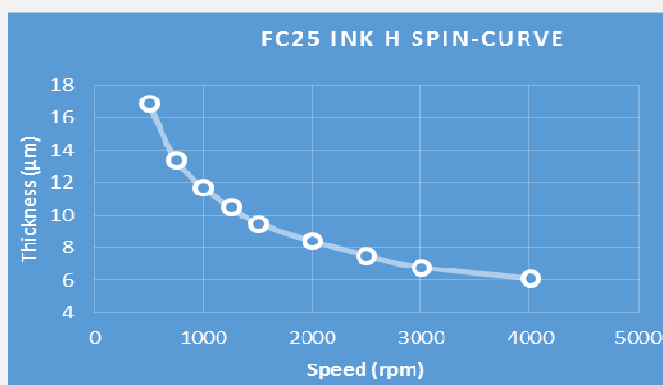
Spin-coating

Materials

- Polymer: Piezotech FC 25 ink H
- Substrate used for data acquisition: glass

Process parameters

- Step 1 :
 - Ramp = 4s
 - RPM = 500 to 4000 rpm
 - Dwell = 60s
- Step 2 :
 - Ramp = 2s
 - RPM = 0
 - Dwell = 0



Piezotech FC 25 ink H spin curve

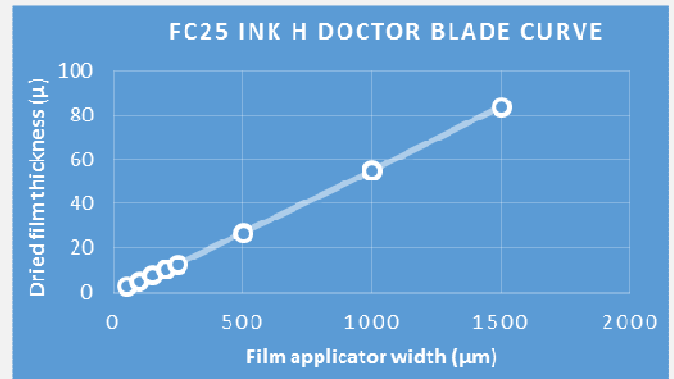
Doctor blade coating

The film thickness obtained depends on the applicator width. The curve present the thickness of the dried film as a function of the coater width.

FC25 Ink H is also adapted for film applicator with micrometer, baker type film applicator and wire bar coater.

Materials

- Polymer: Piezotech FC 25 ink H
- Substrate used for data acquisition: glass
- Traverse speed: 50mm/sec.



Piezotech FC 25 ink H Doctor blade curve

Post-printing Treatment

Annealing

After deposition, the layer has to be annealed above the Curie Transition Temperature to increase crystallinity and performances.

Typical Process

Solvent evaporation:
80°C / 3mn / hot plate

Crystallization: 135°C /
15mn / Infrared oven

Other possibilities

*Vacuum for solvent evaporation and
Conventional oven for the annealing step.*

Poling

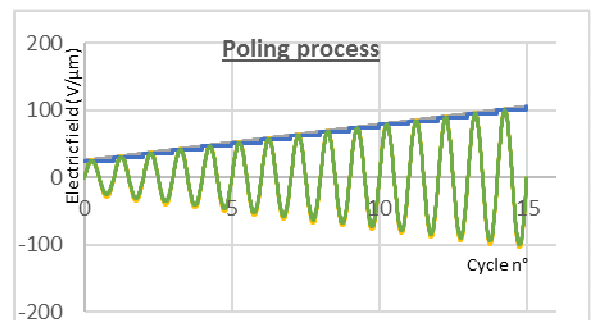
In order to acquire its piezoelectric properties, the ferroelectric layer has to be poled by applying a voltage above the coercive field.

Typical Process

The electric field can be applied according to (when voltage generator is coupled with signal generator):

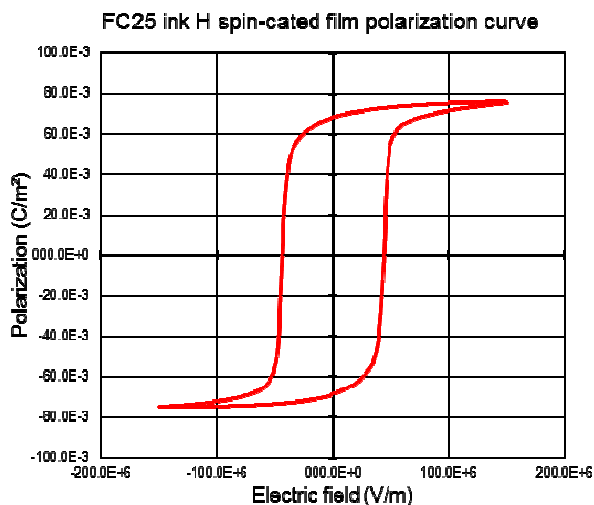
- Number of cycles to reach E_{max} : 15
- Frequency: 0,5Hz (higher is possible)
- Signal: sinusoidal
- $E_{max} > 2E_c$
- Typically $E_{max}=100V/\mu m$

Poling can also be carried out by applying a constant electric field (after a progressive rise) for a few minutes while heating the sample



Typical properties for a poled film obtained from Piezotech FC25 ink H

Relative dielectric permittivity, ϵ_r (1kHz)	12	Remnant polarization P_r (mC/m ²)	70
Piezoelectric coefficient d_{33} (pC/N or pm/V)	-26	Coercive field (V/ μ m)	45
Pyro-electric coefficient, ρ , (μ C/m ² .K)	-22	Dielectric strength (V/ μ m)	400



Typical polarization curve obtained with the printed Piezotech FC ink H

Safety and Storage

Please refer to the safety datasheet

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