








Processing equipment		
apparatus	applications	properties
 <p>inline wet-bench (RENA)</p>	<ul style="list-style-type: none"> <li>- wafer cleaning</li> <li>- isotexture</li> <li>- KOH + KON<sub>x</sub> texture</li> <li>- P-glass etch</li> <li>- edge isolation</li> <li>- single side isotexture</li> <li>- single side polishing</li> <li>- emitter etch back</li> </ul>	<ul style="list-style-type: none"> <li>- 3 tracks</li> <li>- format: 80 x 120 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- up to 2.5m/s</li> <li>- temperature control: 3°C-98°C</li> <li>- 150l fluid storage</li> </ul>
 <p>batch wet-bench (RENA)</p>	<ul style="list-style-type: none"> <li>- wafer cleaning</li> <li>- isotexture</li> <li>- KOH + IPA texture</li> <li>- KOH + KON<sub>x</sub> texture</li> <li>- p-glass etch</li> <li>- emitter etch back</li> </ul>	<ul style="list-style-type: none"> <li>- semi-automatic</li> <li>- wafer-format: 125 mm<sup>2</sup> or 156 mm<sup>2</sup></li> <li>- 50 wafers per batch</li> </ul>
 <p>indus batch wet-bench (RENA)</p>	<ul style="list-style-type: none"> <li>- alkaline etching</li> <li>- industrial cleaning</li> <li>- piranha cleaning</li> <li>- drying</li> </ul>	<ul style="list-style-type: none"> <li>- format: 50 x 50 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- alkaline bath with heating</li> <li>- HCl bath</li> <li>- HF bath</li> <li>- different deionised water cascades for rinsing</li> <li>- piranha bath</li> <li>- oven for drying</li> </ul>
 <p>diffusion furnace (centrotherm)</p>	<ul style="list-style-type: none"> <li>- POCl<sub>3</sub> diffusion</li> <li>- BBr<sub>3</sub> diffusion</li> <li>- thermal ad wet oxidation</li> </ul>	<ul style="list-style-type: none"> <li>- format: 50 x 50 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- up to 200 wafers (400 wafers back to back)</li> </ul>
 <p>doper with roll-on (RENA)</p>	<ul style="list-style-type: none"> <li>- roll on deposition of different precursors</li> </ul>	<ul style="list-style-type: none"> <li>- format: 100 x 100 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- single or double side deposition</li> </ul>
 <p>in-line diffusion furnace (Tecnofimes)</p>	<ul style="list-style-type: none"> <li>- diffusion from roll-on / spin-on / screen-printed precursor</li> </ul>	<ul style="list-style-type: none"> <li>- ceramic rolls</li> <li>- temperature up to 1000°C</li> </ul>

	<ul style="list-style-type: none"> <li>- PECVD</li> <li>- LPCVD</li> <li>- sintering tube</li> </ul>	<ul style="list-style-type: none"> <li>- standard industrial system</li> <li>- wafer format: any size up to 210 x 210 mm<sup>2</sup></li> <li>- PECVD gases: SiH<sub>4</sub>, NH<sub>3</sub>, N<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>O, SF<sub>6</sub>, free line for e.g. doping gas</li> <li>- PECVD graphite boats for up to 196 wafers</li> <li>- LPCVD gases: DCS, NH<sub>3</sub>, N<sub>2</sub>, H<sub>2</sub></li> <li>- sintering of contacts under ArH-atmosphere</li> </ul>
	<ul style="list-style-type: none"> <li>- metallization of front and rear</li> </ul>	<ul style="list-style-type: none"> <li>- semiautomatic screen printer</li> <li>- format: 50 x 50 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- optical adjustment with four cameras</li> <li>- printing process in less than 10s</li> <li>- hot melt printing possible</li> <li>- screen washer</li> <li>- edge alignment + fiducial</li> </ul>
	<ul style="list-style-type: none"> <li>- metallization of front and rear</li> </ul>	<ul style="list-style-type: none"> <li>- semi automatic screen printer</li> <li>- format 156x156mm<sup>2</sup></li> <li>- fiducial and edge alignment possible</li> <li>- printing in less than 15s</li> </ul>
	<ul style="list-style-type: none"> <li>- metallization of rear with subsequent drying</li> </ul>	<ul style="list-style-type: none"> <li>- semi automatic screen printer</li> <li>- format 156x156mm<sup>2</sup></li> <li>- alignment by hand (micrometer screw)</li> <li>- printing in less than 15s</li> <li>- automatic transport to drying furnace</li> </ul> <p>drying furnace:</p> <ul style="list-style-type: none"> <li>- 2 heating zones</li> <li>- up to 220°C</li> <li>- drying time: 3 to 4 minutes</li> </ul>
	<ul style="list-style-type: none"> <li>- drying of metalized samples</li> </ul>	<ul style="list-style-type: none"> <li>- semi automatic operation</li> <li>- paternoster drying furnace</li> <li>- format: 50 x 50 mm<sup>2</sup> to 156 x 156 mm<sup>2</sup></li> <li>- 4 heating zones</li> <li>- 250 places</li> <li>- one drying cycle: ca. 10 minutes</li> <li>- temperature up to 150°C</li> </ul>
	<ul style="list-style-type: none"> <li>- firing of metalized samples</li> </ul>	<ul style="list-style-type: none"> <li>- metal belt furnace</li> <li>- format: 50 x 50 mm<sup>2</sup> to 210 x 210 mm<sup>2</sup></li> <li>- 7m long</li> <li>- 6 heating zones</li> <li>- up to 1000°C</li> <li>- approx. 1.5 min per process (with std. parameters)</li> </ul>
<p>laser (Baccini)</p>		<p>not yet at ISC Konstanz</p>

	<ul style="list-style-type: none"> <li>- numbering</li> <li>- cutting</li> <li>- edge isolation</li> <li>- fine lines opening on dielectric layers (application for selective emitter)</li> </ul>	<ul style="list-style-type: none"> <li>- ND: YVO4 green laser for class 1 operation</li> <li>- easy touch pad software, automatic door security</li> <li>- wave length: 532nm</li> <li>- frequency: 15-200 kHz</li> <li>- power: 18W</li> <li>- fine lines of 50µm width</li> </ul>
<p>laser (Rofin)</p>		
	<ul style="list-style-type: none"> <li>- lamination of cells</li> </ul>	<ul style="list-style-type: none"> <li>- Industrial type laminator</li> <li>- Manual loading and unloading</li> <li>- Sizes: single cell module up to 120 cm x 60 cm module (4x9 5inch cells)</li> <li>- Operating temperature &gt; 160°C</li> <li>- Lamination pressure : 50 - 1000 mbar</li> <li>- Programable lamination cycle</li> </ul>
<p>laminator (NMF-2XZ)</p>		
	<ul style="list-style-type: none"> <li>- electroless silver plating of screen printed finger grid</li> </ul>	<ul style="list-style-type: none"> <li>- wafer-format: 125 mm<sup>2</sup> or - 156 mm<sup>2</sup></li> <li>- batch system</li> <li>- 50 wafers per batch</li> </ul>
<p>electroless Ag-plating (RENA)</p>		
	<ul style="list-style-type: none"> <li>- preparation of samples</li> </ul>	<p>with or without gas-washer</p>
<p>several fume hoods</p>		
	<ul style="list-style-type: none"> <li>- thin surface coatings</li> <li>- 12 process gases</li> </ul>	<ul style="list-style-type: none"> <li>- N<sub>2</sub>, H<sub>2</sub>, O<sub>2</sub> (technical and high purity)</li> <li>- C<sub>3</sub>H<sub>8</sub></li> <li>- Ar, N<sub>2</sub>O, SF<sub>6</sub></li> <li>- SiH<sub>2</sub>Cl<sub>2</sub>, CH<sub>4</sub>, SiH<sub>4</sub>, NH<sub>3</sub></li> </ul>
<p>spinner</p>		
	<ul style="list-style-type: none"> <li>- &gt;10 different chemicals</li> </ul>	<ul style="list-style-type: none"> <li>HCl (32%) (hydrochloric acid)</li> <li>- HF (50%) (hydrofluoric acid)</li> <li>- H<sub>2</sub>O<sub>2</sub> (30%) (hydrogen peroxide)</li> <li>- NaOH (pellets) (sodium hydroxide)</li> <li>- KOH (potassium hydroxide)</li> <li>- HNO<sub>3</sub> (65%) (nitric acid)</li> <li>- CH<sub>3</sub>COOH (99.8%) (acetic acid)</li> <li>- H<sub>2</sub>SO<sub>4</sub> (95-97%) (sulphuric acid)</li> <li>- Na<sub>2</sub>CO<sub>3</sub> (sodium carbonate)</li> <li>- H<sub>3</sub>PO<sub>4</sub> (ortho-phosphorus acid)</li> <li>- 2-propanol (IPA)</li> </ul>
<p>chemicals</p>		