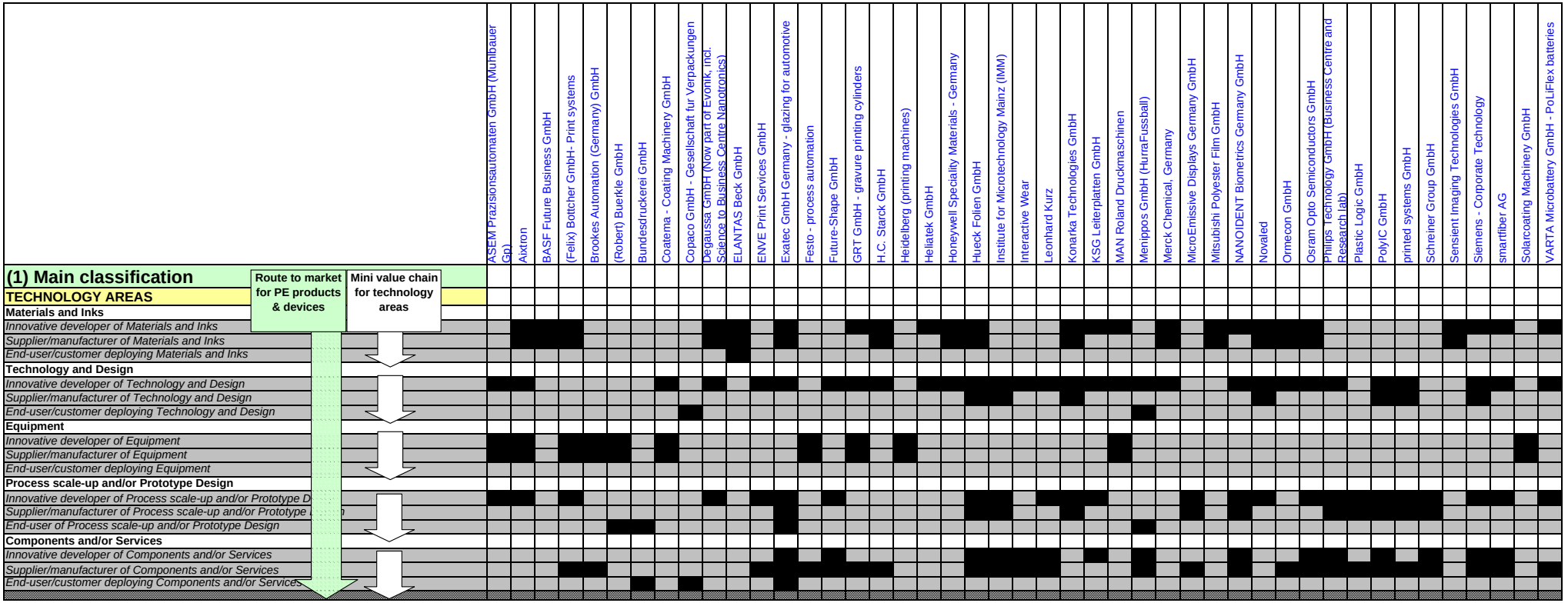
Competence Matrix for Plastic Electronics in Germany. Section 2: Companies



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Competence Matrix for Plastic Electronics in Germany. Section 2: Companies

(2) Materials and Technologies	ASEM Prazisionsautomaten GmbH (Muhlbauer Gp)	Aixtron	BASF Future Business GmbH	(Felix) Bottcher GmbH- Print systems	Brookes Automation (Germany) GmbH	(Robert) Buerkle GmbH	Bundesdruckerei GmbH	Coatema - Coating Machinery GmbH	Copaco GmbH - Gesellschaft fur Verpackungen	Degaussa GmbH (Now part of Evonik, incl. Science to Business Centre Nanotronics)	ELANTAS Beck GmbH	ENVE Print Services GmbH	Exatec GmbH Germany - glazing for automotive	Festo - process automation	Future-Shape GmbH	GRT GmbH - gravure printing cylinders	H.C. Starck GmbH	Heidelberg (printing machines)	Heliatek GmbH	Honeywell Speciality Materials - Germany	Hueck Folien GmbH	Institute for Microtechnology Mainz (IMM)	Interactive Wear	Leonhard Kurz	Konarka Technologies GmbH	KSG Leiterplatten GmbH	MAN Roland Druckmaschinen	Menippos GmbH (HurraFussball)	Merck Chemical, Germany	MicroEmissive Displays Germany GmbH	Mitsubishi Polyester Film GmbH	NANOIDENT Biometrics Germany GmbH	Novaled	Ormecon GmbH	Osram Opto Semiconductors GmbH	Philips Technology GmbH (Business Centre and Research lab)	Plastic Logic GmbH	PolyIC GmbH	printed systems GmbH	Schreiner Group GmbH	Sensient Imaging Technologies GmbH	Siemens - Corporate Technology	smartfiber AG	Solarcoating Machinery GmbH	VARTA Microbattery GmbH - PoLiFlex batteries
THIN FILM PROCESSING FACILITIES AND STATUS																																										
(Cleanroom) facilities and main activities:																																										
R&D (lab-scale processes; exploratory stage; core technology developer)		■	■	■	■	■	■	■		■	■	■	■	■	■	■	■		■	■	■	■			■	■	■	■		■		■	■	■	■	■		■	■	■	■	■
Prototype Line (engineering sample volumes; yield and SPC control)		■						■														■			■	■	■					■	■	■	■			■	■	■	■		
Production line (fully-balanced; shift systems; volume output)		■						■										■				■			■		■	■	■			■		■		■	■	■	■		■		■
SUBSTRATE TYPE AND PREPARATION																																										
Plastic:		■	■	■		■	■	■	■	■	■		■								■	■			■	■	■	■		■		■	■		■		■	■	■	■	■	■	
Other "flexible":							■																	■				■									■						
Stainless steel/metal foil								■														■																					
Paper				■		■	■	■	■	■												■																■	■				
Applicable to rigid substrates		■	■										■								■	■											■	■									
Substrate barrier/encapsulation/planarisation layers						■							■								■	■			■		■						■	■							■	■	■
MAIN THIN FILM PROCESSING STEPS																																										
Printing/Additive processing:	■		■	■		■	■	■	■	■	■	■	■	■			■	■							■	■	■		■	■	■	■		■			■	■	■		■	■
Low resolution, comparatively thick layers (e.g. screen, gravure, offset..)	■		■	■		■	■		■	■	■	■	■			■	■	■			■			■	■	■		■	■		■		■			■	■	■		■	■
High resolution, comparatively thin layers (e.g. inkjet, soft lithography..)												■					■	■								■			■			■				■	■	■			■
Mechanical masking		■																																		■	■						
Direct write/materials modification (e.g. laser ..)																■						■														■						
Sheet deposition of materials from solution - e.g. slit coating, spin coating.			■	■		■	■	■		■	■						■								■	■	■		■		■	■		■		■	■			■	■
Vacuum-based sheet materials deposition		■	■					■					■				■					■			■								■		■	■	■					
Conventional photolithography with wet/dry etch for material definition			■									■										■				■							■		■	■	■					
Process Type:																																										
S2S/batch processing								■																								■					■					
R2R/continuous processing	■					■				■												■			■	■		■									■	■	■		■	

Competence Matrix for Plastic Electronics in Germany. Section 2: Companies

(2) Materials and Technologies (continued)	ASEM Präzisionsautomaten GmbH (Mühlbauer Gp)	Aixtron	BASF Future Business GmbH	(Felix) Bottcher GmbH- Print systems	Brookes Automation (Germany) GmbH	(Robert) Buerkle GmbH	Bundesdruckerei GmbH	Coatema - Coating Machinery GmbH	Copaco GmbH - Gesellschaft fur Verpackungen	Degaussa GmbH (Now part of Evonik, incl. Science to Business Centre Nanotronics)	ELANTAS Beck GmbH	ENVE Print Services GmbH	Exatec GmbH Germany - glazing for automotive	Festo - process automation	Future-Shape GmbH	GRT GmbH - gravure printing cylinders	H.C. Starck GmbH	Heidelberg (printing machines)	Heliatek GmbH	Honeywell Speciality Materials - Germany	Hueck Folien GmbH	Institute for Microtechnology Mainz (IMM)	Interactive Wear	Leonhard Kurz	Konarka Technologies GmbH	KSG Leiterplatten GmbH	MAN Roland Druckmaschinen	Merippos GmbH (HurraFussball)	Merck Chemical, Germany	MicroEmissive Displays Germany GmbH	Mitsubishi Polyester Film GmbH	NANOIDENT Biometrics Germany GmbH	Novaled	Ormecon GmbH	Osram Opto Semiconductors GmbH	Philips Technology GmbH (Business Centre and Research lab)	Plastic Logic GmbH	PolyIC GmbH	printed systems GmbH	Schreiner Group GmbH	Sensient Imaging Technologies GmbH	Siemens - Corporate Technology	smartfiber AG	Solarcoating Machinery GmbH	VARTA Microbattery GmbH - PoLIFlex batteries
MATERIALS AND DEVICES																																											
Main Device Type classification																																											
Active device elements (e.g. (O)TFTs, diodes, PV, PLED..)		■	■							■	■						■					■																				
Passive device elements (e.g. antennas, interconnect, electrodes..)			■							■							■																								
Generic PE applications			■				■	■		■	■	■	■				■																								
Main Material Type classification																																											
Semiconductor		■	■				■			■							■					■																				
Dielectric/Passivation layers			■				■	■		■	■		■									■																				
Matrices and interconnect; transparent conductors			■				■	■		■							■					■																				
Bio/pharma/medical materials																						■																				
Nanotechnology (e.g. tubes, wires..)		■																																								
Phosphors, light emitters/absorbers, lasers		■	■										■																													
Surface modification, surface energy patterning..			■					■														■																				
Coatings, release films..			■			■	■	■		■	■	■	■									■																				
Generic Materials base Research/know-how - suitable for PE devices			■				■	■		■	■	■					■																									
ENCAPSULATION LAYERS FOR ..																																				■							
Backplane/active driving elements:																																											
Frontplane (e.g. display media, sensor elements..):																														■					■	■							
Generic encapsulation layers for PE applications			■				■				■								■	■			■		■		■															
DISPLAY EFFECTS													■																														
OLED - emissive:	■	■	■																							■			■	■			■		■				■	■			
Small molecule OLED		■																											■				■						■	■			
Polymeric OLED																													■	■													
Electrophoretic - reflective																																				■							
Electroluminescent/phosphor-based			■							■			■																		■	■		■			■					
LC-based																												■														
Generic display effects																							■																	■			
SIMULATION AND MODELLING																																											
Materials structure and chemical performance simulation		■	■							■							■		■	■	■	■			■				■		■	■	■	■	■	■		■		■	■			■
Materials/device simulation & architecture design (at elemental device &/or pixel level)																	■					■		■	■	■		■			■	■	■	■	■	■	■	■	■	■			■
Circuit simulation and architecture design (e.g. backplane array, RFID circuit)																										■		■		■		■			■	■	■	■	■	■			■
Thin-film processes (e.g. printing and coating rheology..)	■																																										
Manufacturing processes	■				■	■	■	■	■				■	■	■		■		■										■						■							■	

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(2) Materials and Technologies (continued)																																													
BACK-END INTEGRATION																																													
Electrical contacting to e.g. discrete Si IC drivers via flex-foils	■						■			■					■							■	■			■	■			■		■		■	■	■	■		■	■				■	
Electronics packaging and integration (e.g. module assembly..)	■						■		■			■	■		■							■	■			■	■	■		■		■		■	■	■	■		■	■				■	■
FAILURE ANALYSIS, TEST, METROLOGY ETC.																																													
Development of core testing techniques																																										■			
Test and Measurement:		■	■	■		■	■	■			■		■		■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Electrical		■	■				■	■		■	■		■		■		■				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
Optical/Geometric		■	■	■		■	■	■		■	■		■		■	■	■				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■
Chemical		■	■				■	■		■						■	■		■	■		■			■	■			■		■		■	■	■	■	■	■	■	■		■				
Lifetime/environmental/mechanical		■	■				■	■	■				■		■		■								■		■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		■
Level of testing:																																													
Single/few devices only		■	■							■			■		■		■					■	■		■				■				■	■	■	■	■		■	■	■	■	■	■		■
Component/prototype line/production level							■	■					■									■		■				■		■		■			■		■	■	■	■			■		■

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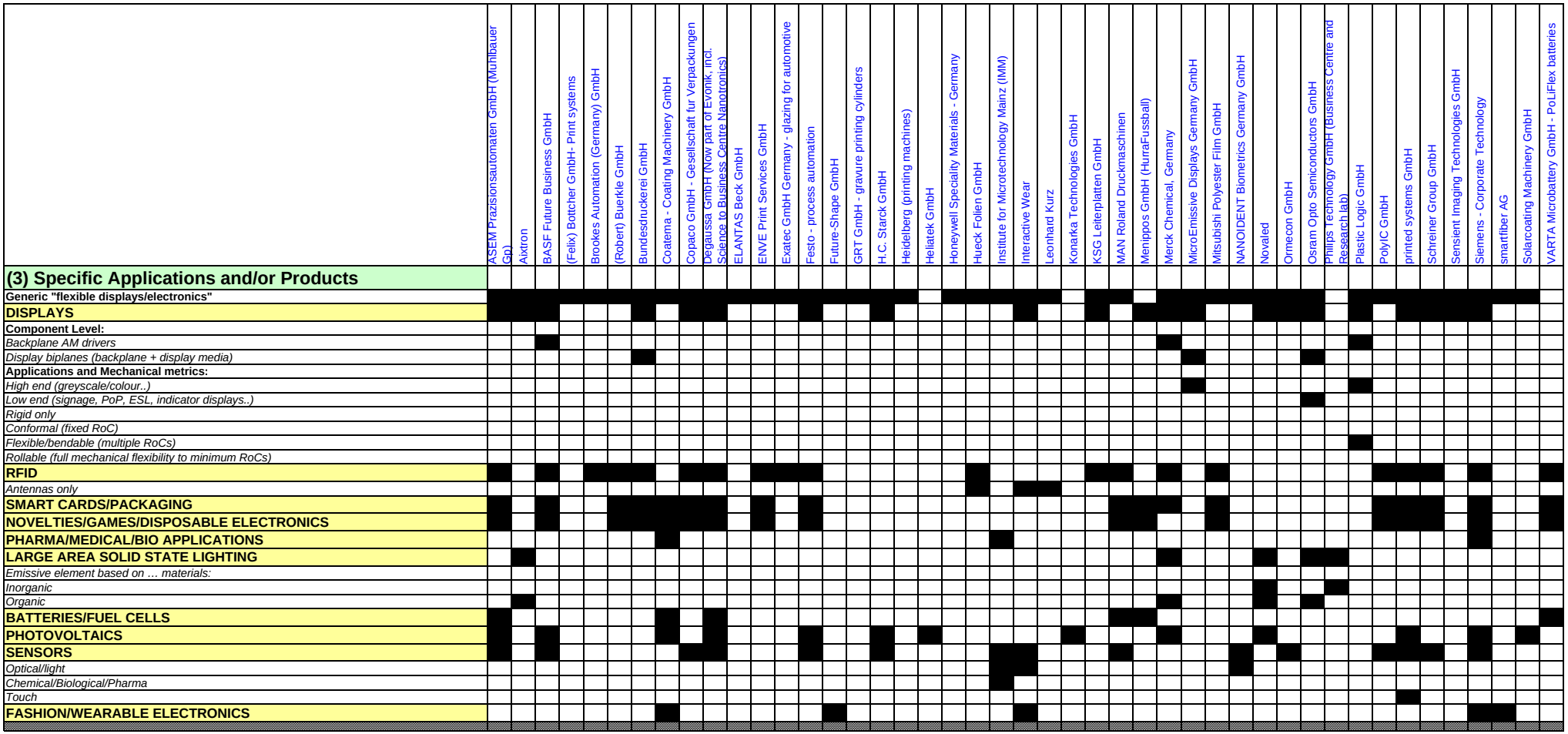

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(4) Component Manufacture and Supply																																										
Substrates:								■																						■													
Plastic																																										
Functional inks:			■																	■																			■			
Organic-based inks			■																	■								■				■										
Inorganic-based inks																					■																		■				
Active elements (e.g. display driving backplanes, solar cells..)																								■			■			■		■			■		■	■	■				■
Passive elements (e.g. antennas, light guides..)																					■			■				■				■			■			■	■				■
Thin-film/printing/post processing manufacturing equipment and consumables:				■	■	■								■		■		■								■																
R&D/lab scale		■		■	■	■								■		■		■																							■	
Prototype/manufacturing scale	■	■		■	■	■								■		■		■																							■	
Display media (e.g. EP, OLED..)																														■			■		■								
Simulation and modelling packages																																											
Discrete Si driver ICs																																											
Back-end integration/flex foils/electronics packaging															■											■																
Test and analysis equipment/service																																										
Complete systems (in relatively low volumes/market sizes)	■																					■	■				■		■		■		■	■			■	■					■
(5) Business Model & Financing																																										
Funding:																																										
VC/angel funded (equity finance)															■				■				■		■				■				■	■			■					
Private or company funding (bank, friends-and-family or own business revenues)	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		■	■	■		■	■	■	■	■	■		■	■	■		■	■	■		■	■	■	■	■
Majority Govt-funded/public sector entity																																										
Involved with Govt grant funded projects (TSB Collaborative R&D, EU FP6/7 etc.)		■	■				■	■	■	■	■							■			■	■		■		■	■		■			■		■	■		■	■				
Current status:																																										
University - focus on Base Technology Research																																										
University - Looking to also spin-out/technology transfer opportunities																																									
Small start-up/SME															■				■			■	■		■		■		■	■		■		■	■	■				■		
Larger corporate/international organisation/established company	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■		■	■			■		■	■	■	■		■		■	■	■	■	■	■		■	■	■
Main Business Model(s):																																										
Open access/Open innovation/Partnership working	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	
Licensing business model (e.g. IP..)													■																■													
Direct manufacture/supply to customers	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■
Currently involved with JDAs/JVs			■				■			■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■