

# Innovation Services

Materials innovation for materials screening and selection at advanced technology nodes.

SERVICE	CATEGORY	TECHNOLOGY	FOCUS AREA	INITIAL SCREENING	SCREENING AT CRITICAL DIMENSION
Dep & e-test	Memory	DRAM	Capacitor dielectrics, contacts	Shadowmask-MIM	Customer vehicle
		NAND	Channel, charge trap, dielectrics, contacts	Shadowmask-MOS	
		(i)PCM	Chalcogenide, contacts	Mushroom-MIM	
		ReRAM	Switching/reservoir layers, contacts	Shadowmask-MIM	
		Emerging NVM	Active material, contacts	Several	
	Selector	OTS	Chalcogenide, contacts	Mushroom-MIM	
		MIEC	Switching layer, contacts		
		TMO			
		MSM			
	Logic	CMOS	HKMG, dielectrics, MEOL	Shadowmask-MOS	
BEOL	Logic/memory	Liner, spacer	Blanket film		

SERVICE	CATEGORY	TECHNOLOGY	FOCUS AREA	INITIAL SCREENING	FINAL SCREENING
Dep & e-test	Quantum computing	Superconductors	Improving critical temperature	Blanket film	Customer vehicle
		Dielectrics	Bulk, interface engineering		
	Display	MO TFT	Mobility, contacts	Shadowmask-MOS	
		Capacitors	Dielectrics	Shadowmask-MIM	
		Glass coatings	Optical, mechanical properties	Blanket film	n/a
	Glass coatings	Low-emissivity	Improving low-emissivity		
		Sol-gel ARC	Mechanical robustness at performance		
	Solar	Contacts	CdTe, c-Si, CIGS, III-V	Blanket film/ customer vehicle	Customer vehicle
		Wet etch			
	III-V	Contacts	LED, transistors	Blanket film	n/a
		Wet etch			
	Alloys	Structural	Low-temperature, light-weight	Blanket film	Customer vehicle
		Thermoelectrics	Heussler, etc.		

# Process Enhancement Services

Materials selection and screening to help find materials for current and past technologies that can reduce costs and enhance yield.

SERVICE	CATEGORY	TECHNOLOGY	FOCUS AREA	INITIAL SCREENING	SCREENING AT CRITICAL DIMENSION
ALD precursor screening	Memory	DRAM	Capacitor dielectrics, interfacial layers	Shadowmask-MIM	Customer vehicle
		NAND	Charge trap, & dielectrics	Shadowmask-MOS	
		(i)PCM	Chalcogenides	Mushroom-MIM	
		Emerging NVM	Dielectrics, active layers	Several	
	Selector	OTS, MIEC, TMO, MSM	Chalcogenides, switching layers	Mushroom-MIM	
	Logic	CMOS	Dielectrics	Shadowmask-MOS	
Wet etch & clean	Memory	DRAM	Wet chemistry optimization	Shadowmask-MIM	
		NAND		Shadowmask-MOS	
		(i)PCM		Mushroom-MIM	
		Emerging NVM		Several	
	Selector	OTS, MIEC, TMO, MSM		Mushroom-MIM	
	Logic	CMOS		Shadowmask-MOS	
PCN simplification	Memory	DRAM	Material supplier qualification	Shadowmask-MIM	
		NAND		Shadowmask-MOS	
		(i)PCM		Mushroom-MIM	
		Emerging NVM		Several	
	Selector	OTS, MIEC, TMO, MSM		Mushroom-MIM	
	Logic	CMOS		Shadowmask-MOS	
BEOL	Logic/memory		Blanket film		