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ORGANIC SEMICONDUCTOR



RAYENERGY TEK
the inventive solution

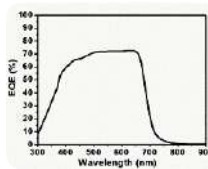
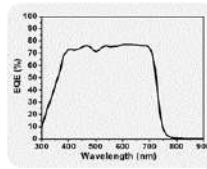
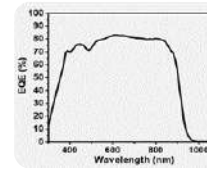
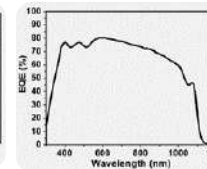
PRODUCT	PV2001	PV2300	PV-D1	PV-D4610
Absorption Spectra (thin film)				
Energy Gap (eV)	1.70	1.72	1.87	1.75
LUMO (eV)	-3.60	-3.79	-3.79	-3.62
HOMO (eV)	-5.30	-5.51	-5.66	-5.37
Processing Solvent	o-xylene	o-xylene	o-xylene	o-xylene
Publications	• Sol. Energy Mater. Sol. Cell 2019, 202, 110064 • Nat. Commu. 2018, 9, 3631	• Sol. RRL 2021, 2000749 • J. Mater. Chem. A 2021, 9, 17967	-	• Adv. Sci. 2015, 1500342 • J. Mater. Chem. A 2021, 9, 17967

PRODUCT	TPD-3F (also sell TPD-3)	N2200* (also sell N2300*)	PM6 (also sell PM7 & PCE12)	PfBT4T-2OD (also sell PfBT4T-2DT)
Synonym	NF3000-P	P(NDI2OD-T2)	PBDB-T-2F	PCE11
Formula				
CAS No.	2499690-26-3	1100243-40-0	1802013-83-7	1644164-62-4
Molecular Weight	Mn: 30-70 kDa	Mn: 50-100 kDa	Mn: 50-100 kDa	Mn: 30 - 90 kDa
HOMO (eV)	-5.64	-5.80	-5.54	-5.34
LUMO (eV)	-3.76	-4.33	-3.65	-3.69
Publications	• Joule 2020, 4, 189-206 • Adv. Energy Mater. 2021, 2102648	• Journal of the American Chemical Society, 2015, 137(6), 2359-2365 • Nature, 2009, 457(7230), 679-686	• Adv. Mater. 2015, 27, 4655 • Nature Commun. 2019, 10, 2515 • Adv. Mater. 2018, 30, 1707170 • Adv. Mater. 2019, 31, 1902965	• Nat. Commun. 2014, 5, 5293.

* N2200 series – patents licensed by Flexterra Inc.

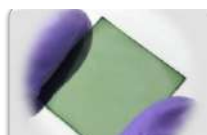
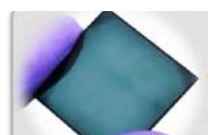
- We also offer a series of proprietary non-fullerene acceptor for OPV/OPD applications. For more information, please contact us.

Formulation for OPDs

PRODUCT	PD-VISIBLE-M	PD-VISIBLE-R	PD-850	PD-940	PD-1300	
Wavelength	300-700 nm	300-750 nm	390-940 nm	300-1100 nm	>1100 nm	
External Quantum Efficiency						
Dark Current	$< 10^{-9} \text{ A/cm}^2$	$\sim 10^{-9} \text{ A/cm}^2$	$< 10^{-8} \text{ A/cm}^2$	$< 10^{-8} \text{ A/cm}^2$		
Processing Method	• Spin coating • Blade coating • Slot-die coating					

- The solvent of all formulations is mainly o-xylene based.
- The devices are based on the structure of glass/ITO/ETL/Photoactive layer/MoO₃/Ag.

Formulation for OPVs

PRODUCT	OPV-Green	OPV-Blue	OPV-Brown	OPV-Gray	PV-X Plus
Film Appearance					
Voc(V)	0.80	0.82	0.80	0.82	0.84
Jsc(mA/cm ²)	14	13	15	15	24
Fill Factor(%)	75	75	74	73	78
Efficiency(%)	8	8	9	9	15
Publications	• Sol. Energy Mater. Sol. Cell 2019, 202, 110064 • Nat. Commu. 2018, 9, 3631	• Adv. Sci. 2015, 1500342 • J. Mater. Chem. A 2021, 9, 17967	• Org. Electron. 2016, 38, 139 • Sol. Energy Mater. Sol. Cell 2019, 202, 110064	-	• Sol. RRL 2021, 2000749 • J. Mater. Chem. A 2021, 9, 17967

- The solvent of all formulations is mainly o-xylene based.
- The devices are measured under 1 sun AM1.5G, based on the structure of glass/ITO/ETL/Photoactive layer/MoO₃/Ag.

Formulation for Interlayers



Electronic Transporting Materials

Product	PV-E002	ELT-2	Avantama* N-21X-Flex
Materials	Polyelectrolyte, Cross-linkable	Sol-gel derived ZnO	AZO nanoparticles
Processing Solvent	Butanol	Propanol	Mixed alcohol
Processing Method	• Spin coating • Blade coating • Slot-die coating		
Applications	OPV/OPD	OPV/OPD	OPV/OPD

Hole Transporting Materials

Product	HTL-X	HTL-X-SP	Avantama* P-22
Materials	PEDOT-based	PEDOT-based	NiO nanoparticles
Processing Solvent	Water/Alcohol Mixture	Water/Alcohol Mixture	Ethanol
Processing Method	• Blade coating • Slot-die coating	• Spin coating • Blade coating • Slot-die coating	• Spin coating • Blade coating • Slot-die coating
Applications	OPV/OPD with deep-lying HOMO level ≤ 5.5 eV	OPV/OPD with deep-lying HOMO level ≤ 5.5 eV	OPV/OPD

* Raynergy Tek is a non-exclusive agent to distribute the above-mentioned Avantama product in Mainland China and Taiwan

Device Engineering and Technical Support

- ◆ Kilogram-scale materials production facilities
- ◆ Material and formulation Customization
- ◆ Bridging the gap of lab to fab, support in optimization of process and device engineering



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