

International Institute for Carbon-Neutral Energy Research



Roadmap Revision

Molecular Photoconversion Devices

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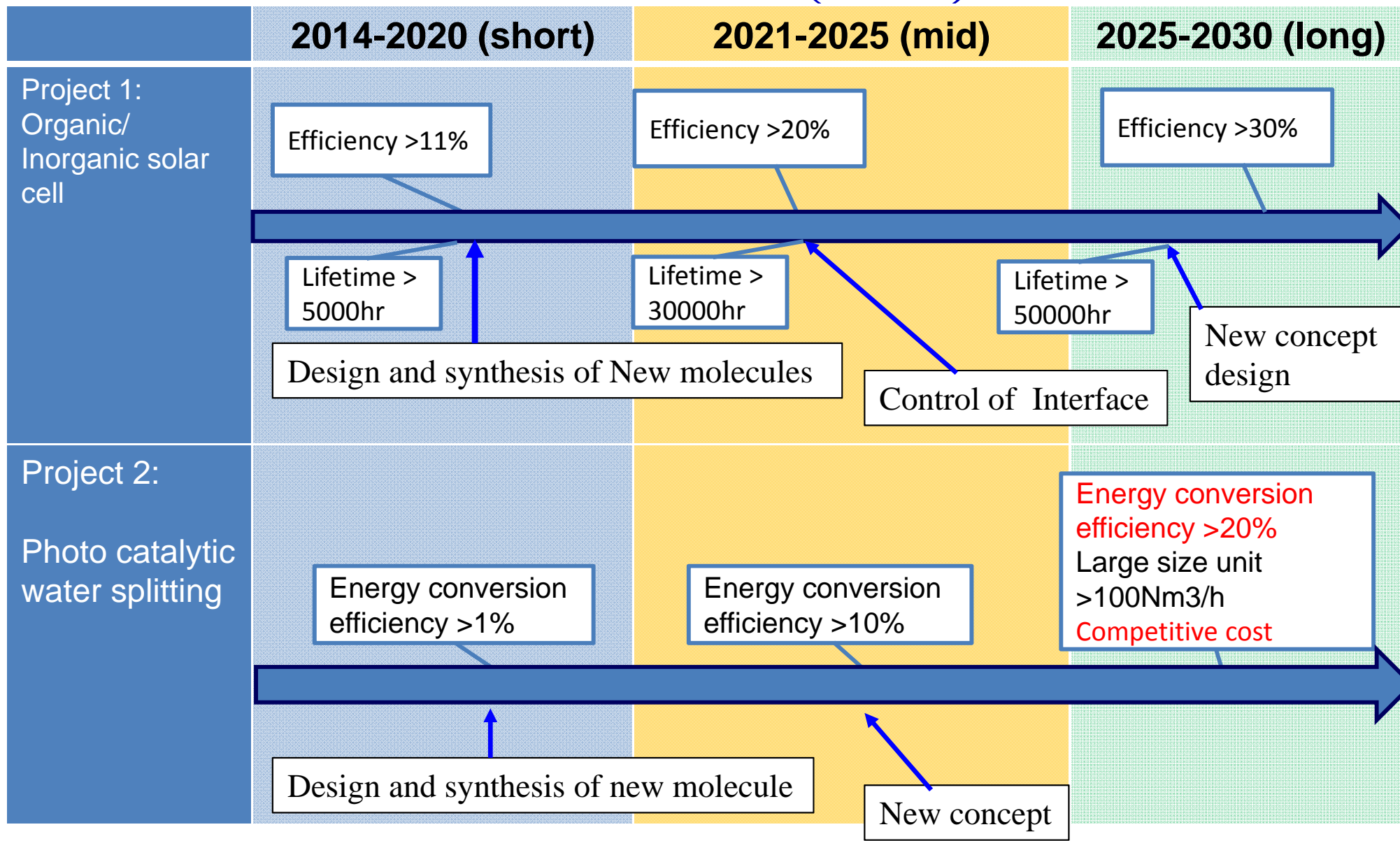
Division Objectives

- Production of Hydrogen without forming CO₂: Use of solar energy to produce hydrogen through two pathways; Organic PV and Photo-electrochemical Water Splitting.
- Development of energy conservation devices: Organic light emitting diode, and low friction bearings.

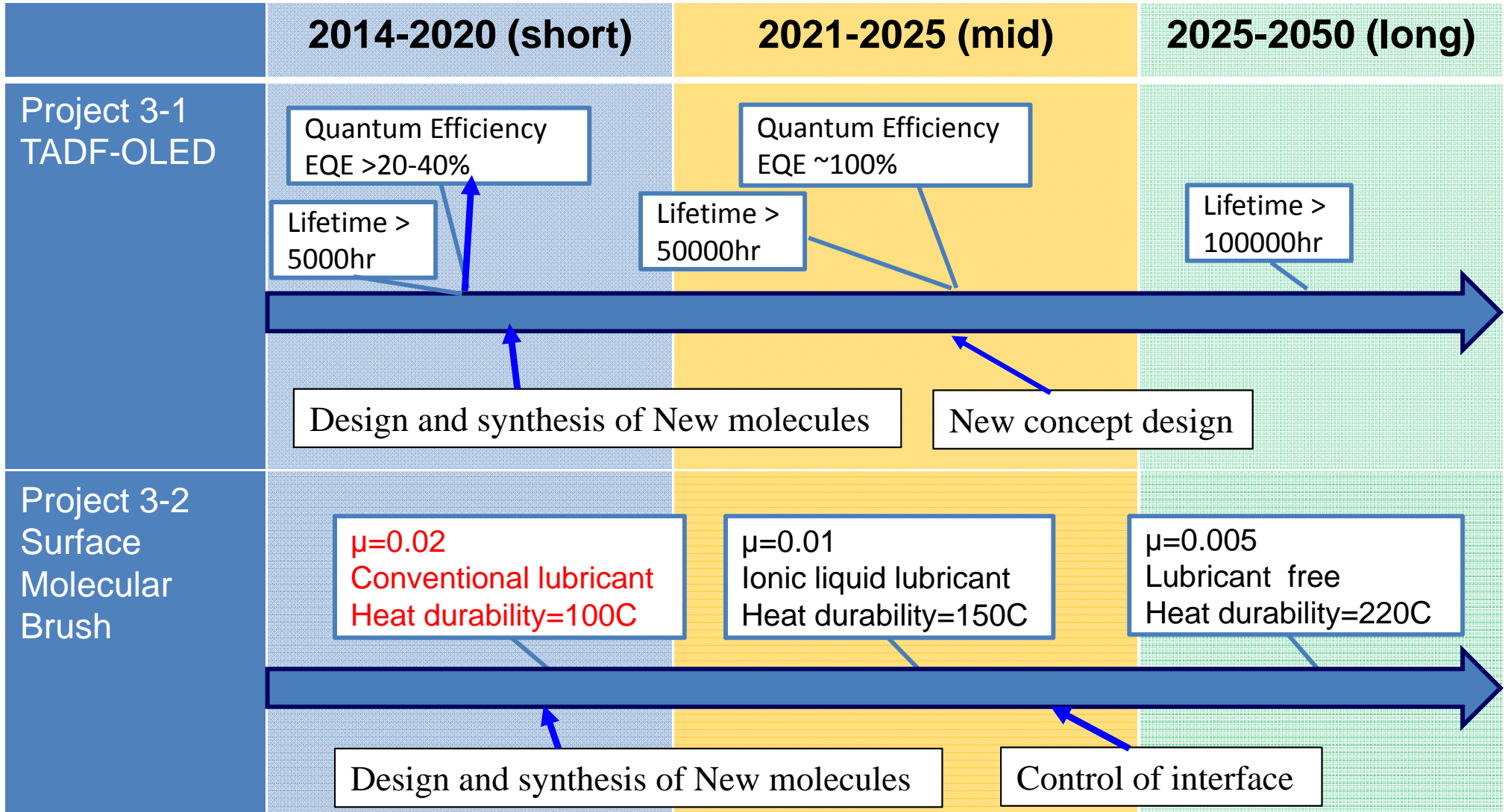
Division Projects

Projects	Objective	Research Efforts	Researchers
Project 1 Organic/Inorganic solar cell	Organic /Inorganic solar cell with high efficiency	Control of interface structure for preventing recombination of excited charge. /new inorganic materials	Adachi, Nakanotani, Goshi, Rockett
Project 2-1 Hybrid catalyst for Photo water splitting	Water splitting with organic and inorganic composite	Optimized inorganic and organic semiconductor for effective charge separation	Ishihara, Ida, Hagiwara, T.Sakai, Stakov. Artekin, Takahara, Higaki, Watanabe, Li, Guo, Honda
Project 2-2 Molecular catalyst for Photo water splitting	<i>Water splitting with molecular photocatalysts</i>	<i>Fabrication of rapid catalytic cycles for water oxidation and reduction by fine tune of structural and electronic properties of organometallic frameworks</i>	<i>K. Sakai, Yamauchi</i>
Project 3-1 OLED	Development of new concept molecule for light emitted	Design and synthesis of new concept molecule named Thermal Activated Delay Fluorescence (TADF)	Adachi, Nakanotani, Goshi
Project 3-2 Surface Molecular Blush	Development of low friction bearings based on molecular blush	Design of molecules for surface coating for molecular blush	Higaki, Takahara, Ertkin, Tanaka, Shundo,

Milestones (new)



Milestones (new)



	Ultimate targets	Current Benchmarks
Project 1 Organic/Inorganic solar cell	<ul style="list-style-type: none"> Overall Energy Efficiency >20% Durability: <1%@1000hrs? Payback year <1 years 	<ul style="list-style-type: none"> Efficiency=12% Durability: low Grazel et al.
Project 2 Photo catalytic water splitting	<ul style="list-style-type: none"> Energy conversion efficiency >20% Large size unit >100Nm³/h Competitive cost <20 yen/m³ 	<ul style="list-style-type: none"> Efficiency=1.1% Durability is low Sheet catalyst Domen et al.
Project 3-1 OLED	<ul style="list-style-type: none"> Energy conversion efficiency >100lm/W Size; 5cmx5cm Half brightness life>10,000h, low cost 	<ul style="list-style-type: none"> Efficiency = 131 lm/W Konica Minolta <ul style="list-style-type: none"> Efficiency = 90 lm/W Leo et al.
Project 3-2 Surface Molecular Brush	<ul style="list-style-type: none"> $\mu=0.005$ Lubricant free Heat durability=220C 	<ul style="list-style-type: none"> $\mu=0.1$(Gel coat) Wada et al