

## **Electro Oxidation - Company Evaluation Report, 2025**

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### **Report description:**

The Electro-Oxidation Companies Quadrant is a comprehensive industry analysis that provides valuable insights into the global market for Electro-Oxidation. This quadrant offers a detailed evaluation of key market players, technological advancements, product innovations, and emerging trends shaping the industry. MarketsandMarkets 360 Quadrants evaluated over 100 companies, of which the Top 10 Electro-Oxidation Companies were categorized and recognized as quadrant leaders.

Electro-oxidation technology is an advanced oxidation process (AOP) engineered to treat wastewater by utilizing electrical current to produce strong oxidants-chieflly hydroxyl radicals-that break down pollutants. The method works by immersing conductive electrode pairs, such as boron-doped diamond (BDD), lead dioxide, or mixed metal oxide, into wastewater, where a low-voltage current drives pollutant degradation either directly through electron transfer at the anode surface or indirectly via the formation of reactive species like chlorine or ozone. Its strength lies in its capacity to degrade refractory organic compounds, micropollutants, PFAS, and pathogens, and it can be integrated into both continuous-flow and batch systems. The effectiveness of the process depends largely on the electrode materials, which influence oxidation strength and energy efficiency, establishing Electro-Oxidation as a vital component of contemporary wastewater treatment strategies. Its applications extend across municipal wastewater plants-addressing emerging contaminants-and industrial operations in sectors such as pharmaceuticals, textiles, food & beverage, mining, and electronics, where it handles challenging effluent streams. The technology is particularly effective at eliminating persistent organic pollutants and disinfecting water, offering a reliable solution for industries with strict discharge requirements. Its rising adoption is driven by the need to manage emerging contaminants like PFAS, increasingly stringent global discharge regulations, and the shortcomings of traditional biological and chemical treatment systems in handling persistent pollutants. Additionally, electro-oxidation's low sludge output and compact system footprint make it attractive for installations with space limitations. Further potential lies in coupling the system with renewable energy sources to reduce operational expenses, implementing decentralized setups for remote or rural sites, and expanding its use in water-scarce regions and developing markets.

Electro-oxidation is a highly efficient advanced oxidation process (AOP) for treating water and wastewater, using electrical energy to chemically dismantle even stubborn contaminants such as per- and polyfluoroalkyl substances (PFAS), complex organics, and pharmaceuticals. The system functions by placing pairs of conductive electrode materials-typically anodes-into the water stream and applying a low-level electrical current, which triggers a sequence of oxidation reactions. At the anode, chemical bonds are broken directly or indirectly through the production of reactive molecules, while water molecules simultaneously generate potent radicals and oxidants that continue the degradation chain. This cycle proceeds until pollutants are fully mineralized into basic

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components like carbon, oxygen, hydrogen, and mineral salts, effectively neutralizing waste and enabling compliance with tough environmental standards. Electrode material selection-such as boron-doped diamond (BDD) or mixed metal oxides-is crucial, with customized combinations enhancing chemical reactivity, energy savings, and cost-effectiveness over time. In contrast to other oxidation methods like incineration, thermal oxidation, or supercritical water oxidation (SCWO), electro-oxidation runs at ambient temperature and pressure, reducing safety risks and adapting well to varying water compositions, including high total dissolved solids (TDS) and volatile organic compounds (VOCs). This makes it particularly useful for treatment systems with upstream components like ion exchange.

The 360 Quadrant maps the Electro-Oxidation companies based on criteria such as revenue, geographic presence, growth strategies, investments, and sales strategies for the market presence of the Electro-Oxidation quadrant. The top criteria for product footprint evaluation included By ELECTRODE MATERIAL (Boron-Doped Diamond, Lead Dioxide, Stannic Oxide, Titanium Suboxide, Graphite, Platinum), By TYPE (Direct Electro-Oxidation, Indirect Electro-Oxidation), By END-USE INDUSTRY (Municipal Water & Wastewater, Industrial Manufacturing, Textiles, Food & Beverage, Mining, Others), and By APPLICATION (Organic & Micropollutant Treatment Segment, Inorganic Treatment, Disinfection & Specialized Treatment).

Key players in the Electro-Oxidation market include major global corporations and specialized innovators such as Lummus Technology, OVIVO USA LLC, Valence Water Inc, Hydroleap, Jiangsu Jingyuan Environmental Protection Co., Ltd, Ground Effects Environmental Services Inc, E-FLOC Wastewater Solutions, Yasa ET (Shanghai) Co., Ltd., Aqua Pulsar, and Axine Water Technologies. These companies are actively investing in research and development, forming strategic partnerships, and engaging in collaborative initiatives to drive innovation, expand their global footprint, and maintain a competitive edge in this rapidly evolving market.

#### Top 3 Companies

##### Lummus Technology

Lummus Technology is a prominent player renowned for its innovative water and wastewater treatment solutions, particularly its Zimpro Electro-Oxidation technology. Founded in 1907 and headquartered in Houston, Texas, Lummus leverages its historical expertise to offer sustainable solutions that address persistent pollutants such as PFAS in wastewater sectors. The company's market share strategy involves expanding through geographic diversification and strategic partnerships. Notably, Lummus Technology has grown its influence in North America, Europe, and Asia-Pacific by acquiring key technologies and partnerships.

##### OVIVO Inc

OVIVO Inc delivers specialized water and wastewater treatment solutions across multiple sectors, including municipalities and industries. Known for its Obreak system developed in concert with E2metrix, OVIVO is focused on energy-efficient, low-maintenance electro-oxidation processes. The company's market strategy centers on expanding its presence in North America, Europe, Asia, and the Middle East through acquisitions like that of E2metrix, strengthening its capabilities in PFAS removal.

##### Jiangsu Jingyuan Environmental Protection Co., Ltd

Jiangsu Jingyuan Environmental Protection Co., Ltd, based in China, excels in electrocatalytic oxidation technology for treating industrial wastewater. Dominating the Asia Pacific region, the company has made inroads into North America, with a focus on scalability and robust performance. Despite facing challenges like high installation costs and limited global brand recognition, Jiangsu Jingyuan's strategic partnerships and local manufacturing give it a competitive edge.

#### Table of Contents:

- 1 INTRODUCTION 11
- 1.1 MARKET DEFINITION 11
- 1.2 INCLUSIONS & EXCLUSIONS 11
- 1.3 STAKEHOLDERS 12
- 2 EXECUTIVE SUMMARY 13
- 3 MARKET OVERVIEW 17
- 3.1 INTRODUCTION 17
- 3.2 MARKET DYNAMICS 17

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3.2.1	DRIVERS	18
3.2.1.1	Rising demand for PFAS and micro-pollutant remediation	18
3.2.1.2	Adoption in decentralized and modular wastewater treatment	18
3.2.2	RESTRAINTS	19
3.2.2.1	Limited expertise and supply chain vulnerabilities for specialized electrodes	19
3.2.3	OPPORTUNITIES	19
3.2.3.1	Integration of renewable energy sources to reduce operational costs	19
3.2.3.2	Treatment of non-biodegradable organic compounds and nitrogen organisms	20
3.2.4	CHALLENGES	21
3.2.4.1	Partial oxidation of ammonia and ions requiring additional processes	21
3.3	IMPACT OF GENERATIVE AI ON ELECTRO-OXIDATION MARKET	21
3.3.1	INTRODUCTION	21
3.3.2	IMPACT ON ELECTRO-OXIDATION MARKET	22
4	INDUSTRY TRENDS	24
4.1	INTRODUCTION	24
4.2	TRENDS/DISRUPTIONS IMPACTING CUSTOMER BUSINESS	24
4.3	VALUE CHAIN ANALYSIS	25
4.3.1	RAW MATERIAL PROCUREMENT	26
4.3.2	TECHNOLOGY DEVELOPMENT & R&D	26
4.3.3	COMPONENT MANUFACTURING & ASSEMBLY	27
4.3.4	SYSTEM INTEGRATION & END-USE CUSTOMIZATION	27
4.3.5	DISTRIBUTION, INSTALLATION & AFTER-SALES SERVICE	27
4.4	ECOSYSTEM ANALYSIS	28
4.5	TECHNOLOGY ANALYSIS	29
4.5.1	KEY TECHNOLOGIES	29
4.5.2	COMPLEMENTARY TECHNOLOGIES	30
4.6	PATENT ANALYSIS	30
4.6.1	METHODOLOGY	31
4.6.2	PATENTS GRANTED, 2015-2024	31
4.6.3	PATENT PUBLICATION TRENDS	31
4.6.4	INSIGHTS	32
4.6.5	LEGAL STATUS OF PATENTS	32
4.6.6	JURISDICTION ANALYSIS	32
4.6.7	TOP APPLICANTS	33
4.6.8	LIST OF MAJOR PATENTS	34
4.7	KEY CONFERENCES AND EVENTS, 2025-2026	35
4.8	PORTER'S FIVE FORCES ANALYSIS	35
4.8.1	THREAT OF NEW ENTRANTS	36
4.8.2	THREAT OF SUBSTITUTES	37
4.8.3	BARGAINING POWER OF SUPPLIERS	37
4.8.4	BARGAINING POWER OF BUYERS	38
4.8.5	INTENSITY OF COMPETITIVE RIVALRY	38
5	COMPETITIVE LANDSCAPE	39
5.1	INTRODUCTION	39
5.2	KEY PLAYER STRATEGIES/RIGHT TO WIN	39

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5.3	MARKET SHARE ANALYSIS, 2024	40
5.4	REVENUE ANALYSIS	43
5.5	BRAND/PRODUCT COMPARISON	44
5.6	COMPANY EVALUATION MATRIX: KEY PLAYERS, 2024	46
5.6.1	STARS	46
5.6.2	EMERGING LEADERS	46
5.6.3	PERVASIVE PLAYERS	46
5.6.4	PARTICIPANTS	46
5.6.5	COMPANY FOOTPRINT: KEY PLAYERS, 2024	48
5.6.5.1	Company footprint	48
5.6.5.2	Region footprint	49
5.6.5.3	Product type footprint	49
5.6.5.4	Application footprint	50
5.6.5.5	End-use industry footprint	50
5.7	COMPANY EVALUATION MATRIX: STARTUPS/SMES, 2024	51
5.7.1	PROGRESSIVE COMPANIES	51
5.7.2	RESPONSIVE COMPANIES	51
5.7.3	DYNAMIC COMPANIES	51
5.7.4	STARTING BLOCKS	51
5.7.5	COMPETITIVE BENCHMARKING: STARTUPS/SMES, 2024	53
5.7.5.1	Detailed list of key startups/SMEs	53
5.7.5.2	Competitive benchmarking of key startups/SMEs	54
5.8	COMPANY VALUATION AND FINANCIAL METRICS, 2024	55
5.9	COMPETITIVE SCENARIO	56
5.9.1	DEALS	56
5.9.2	OTHER DEVELOPMENTS	58
6	COMPANY PROFILES	59
6.1	KEY PLAYERS	59
6.1.1	LUMMUS TECHNOLOGY	59
6.1.1.1	Business overview	59
6.1.1.2	Products/Solutions/Services offered	60
6.1.1.3	Recent developments	60
6.1.1.3.1	Deals	60
6.1.1.4	MnM view	60
6.1.1.4.1	Right to win	60
6.1.1.4.2	Strategic choices	61
6.1.1.4.3	Weaknesses and competitive threats	61
6.1.2	OVIVO USA LLC	62
6.1.2.1	Business overview	62
6.1.2.2	Products/Solutions/Services offered	63
6.1.2.3	Recent developments	63
6.1.2.3.1	Deals	63
6.1.2.3.2	Other developments	64
6.1.2.4	MnM view	64
6.1.2.4.1	Right to win	64
6.1.2.4.2	Strategic choices	64
6.1.2.4.3	Weaknesses and competitive threats	65

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- 6.1.3 VALENCE WATER INC 66
  - 6.1.3.1 Business overview 66
  - 6.1.3.2 Products/Solutions/Services offered 67
  - 6.1.3.3 Recent developments 67
    - 6.1.3.3.1 Other developments 67
  - 6.1.3.4 MnM view 67
    - 6.1.3.4.1 Right to win 67
    - 6.1.3.4.2 Strategic choices 68
    - 6.1.3.4.3 Weaknesses and competitive threats 68
- 6.1.4 HYDROLEAP 69
  - 6.1.4.1 Business overview 69
  - 6.1.4.2 Products/Solutions/Services offered 69
  - 6.1.4.3 Recent developments 70
    - 6.1.4.3.1 Other developments 70
  - ?
  - 6.1.4.4 MnM view 70
    - 6.1.4.4.1 Right to win 70
    - 6.1.4.4.2 Strategic choices 70
    - 6.1.4.4.3 Weaknesses and competitive threats 70
- 6.1.5 JIANGSU JINGYUAN ENVIRONMENTAL PROTECTION CO., LTD 71
  - 6.1.5.1 Business overview 71
  - 6.1.5.2 Products/Solutions/Services offered 71
  - 6.1.5.3 MnM view 72
    - 6.1.5.3.1 Right to win 72
    - 6.1.5.3.2 Strategic choices 72
    - 6.1.5.3.3 Weaknesses and competitive threats 72
- 6.1.6 GROUND EFFECTS ENVIRONMENTAL SERVICES INC 73
  - 6.1.6.1 Business overview 73
  - 6.1.6.2 Products/Solutions/Services offered 73
- 6.1.7 E-FLOC WASTEWATER SOLUTIONS 74
  - 6.1.7.1 Business overview 74
  - 6.1.7.2 Products/Solutions/Services offered 74
- 6.1.8 YASA ET (SHANGHAI) CO., LTD 75
  - 6.1.8.1 Business overview 75
  - 6.1.8.2 Products/Solutions/Services offered 76
- 6.1.9 AQUA PULSAR 77
  - 6.1.9.1 Business overview 77
  - 6.1.9.2 Products/Solutions/Services offered 78
- 6.1.10 AXINE WATER TECHNOLOGIES 79
  - 6.1.10.1 Business overview 79
  - 6.1.10.2 Products/Solutions/Services offered 79
  - 6.1.10.3 Recent developments 80
    - 6.1.10.3.1 Deals 80
    - 6.1.10.3.2 Other developments 80
- 6.2 OTHER PLAYERS 81
  - 6.2.1 AEOLUS SUSTAINABLE BIOENERGY PVT. LTD 81
  - 6.2.2 MAGNELI MATERIALS 82

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6.2.3	HUNAN BOROMOND EPT CO. LTD.	83
6.2.4	VENTILAQUA	84
6.2.5	RT SAFEBALLAST PVT LTD.	85
6.2.6	MAGNETO SPECIAL ANODES (SUZHOU) CO., LTD.	86
6.2.7	AQUACARE SOLUTION ENVIRO ENGINEERS	87
6.2.8	GREEN ECOWATER SYSTEMS	88
6.2.9	BLUE EDEN CLEAN TECHNOLOGY	89
6.2.10	PPU UMWELTECHNIK	90
	?	
7	APPENDIX	91
7.1	RESEARCH METHODOLOGY	91
7.1.1	RESEARCH DATA	91
7.1.1.1	Secondary data	92
7.1.1.2	Primary data	92
7.1.2	RESEARCH ASSUMPTIONS	93
7.1.3	GROWTH FORECAST	94
7.1.4	RISK ASSESSMENT	94
7.2	COMPANY EVALUATION MATRIX: METHODOLOGY	96
7.3	AUTHOR DETAILS	99

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