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Electro Oxidation - Company Evaluation Report, 2025

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Abstracts

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—chiefly 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

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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 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.,

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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.

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FIGURE 24 ELECTRO-OXIDATION MARKET: RESEARCH DESIGN

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