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Optical Emission Spectroscopy for CO2 Dissociation using a Dielectric Barrier Discharge (VADER)[1] MICHAEL LINDON, EARL SCIME, West Virginia University, MICHAEL GALLAGHER, DUSHYANT SHEKHAWAT, NETL, MIKE BERGEN, URS, DAVE BERRY, NETL — VADER (the Versatile Atmospheric Dielectric barrier discharge ExpeRiment) operates at atmospheric pressure and employs high voltage pulses across a quartz dielectric spanning an anode-cathode pair to create a high density, non-thermal, cool plasma in a variety of gasses. In CO_2 plasmas, energetic electrons from the tail of the non-thermal electron distribution excite CO_2 molecular states and provide a pathway for CO_2dissociation that requires less energy per molecule than conventional thermal dissociation processes. CO_2 dissociation by-products can then be used as feedstock gasses for chemical synthesis. Here we have used optical emission spectroscopy in the reaction zone of VADER to monitor the density of reaction products and optimize the dissociation process. The optical emission measurements are correlated with real-time residual gas analyzer (RGA) measurements of the discharge exhaust gas.

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