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The role of negative ions in the formation of filamentary efficient plasma in air at atmospheric pressure EMMANUEL MARODE, CNRS — Pollution control by removal of hazardous species in flue gas exhaust, sterilization for medical purposes, triggering fuel combustion in vehicle motors, etc... all these applications require that the electrical discharge create electron swarms with electron energies able to trigger sets of collision reactions into the gas to meet the needs of the specific application. For such a purpose, non-thermal plasmas are now widely used. During the streamer-to-spark transition in air, in positive non-uniform gaps, at atmospheric pressure, various discharge regions appear characterized by different values of the electron energy ε. Within the small front of ionization wave, called streamer (some tens of micrometer), ε may reach tens of eV. But within the filamentary plasma track left by the streamer, ε goes down since, the mean electrical field is very low. But, in spite of the low mean field, a high field region is created named "secondary streamer", where plasma chemistry may take place. Attachment and detachment of electrons within this filamentary plasma seams to have a key role in the properties of that region. Such filamentary plasma state may be controlled by external means, and offer a basis to chemical plasma reactors.

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