4D08: MECHANISM OF IGNITION BY NON-EQUILIBRIUM PLASMA.

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How do your conclusions for methane compare with those of [1], namely the pulsed plasma produces radicals which quickly decay leaving behind H_2 and CO which enhance flame ignition.

Reference:

[1] W. Kim, M.G. Mungal, M.A. Cappelli, *Appld. Phys. Letters*, 92, 051503 (2008) 3.

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We have demonstrated in [1,2] that for temperatures above the self-ignition threshold and high E/n values the discharge phase leads to atomic oxygen, atomic hydrogen and CHx radicals formation. These radicals start the chemical chains and partially convert to CO and H_2. But CO and H_2 formation does not stop the chain ignition mechanism. Below self-ignition threshold CO and H_2 production competes with formation of peroxides, H_2O_2 and HO_2. These processes lead to mixture sensitization which enhances the ignition in longer time scale. For low temperature conditions we have strong competition between recombination and hydroperoxides formation due to reactions of hydrocarbons with O(1D) and OH radicals [3]. Thus we have different mechanisms of plasma assisted ignition for different initial temperatures.

References:

[1] Evgeny I. Mintoussov, Svetlana E. Yankina, Andrey A. Nikipelov, Svetlana S. Starikovskaia, Andrey Yu. Starikovskii, 45th AIAA Aerospace Sciences Meeting and Exhibit, 8–11 Jan 2007 Grand Sierra Resort Hotel Reno, Nevada. Paper AIAA-2007-1354.
[2] I.N. Kosarev, S.V. Kindusheva, N.L. Aleksandrov, S.M. Starikovskaia, A.Yu. Starikovskii, 45th AIAA Aerospace Sciences Meeting and Exhibit, 8–11 Jan 2007 Grand Sierra Resort Hotel Reno, Nevada. Paper AIAA-2007-1386.
[3] N.B. Anikin, S.M. Starikovskaia, A.Yu. Starikovskii, *Journal of Physics D: Applied Physics* 39 (2006) 3244–3252.