Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Pulsed-plasma destruction of phenol in an aqueous solution

KOHKI SATOH, HIDEYUKI ITABASHI, Muroran Institute of Technology, YASUSHI MIYAZAKI, Nippon Steel Corporation, HIDENORI ITOH, Muroran Institute of Technology — An aqueous solution of phenol is exposed to pulsed-discharge plasma, and the decomposition characteristics of phenol are investigated for the different composition of a background gas. It is likely that OH radicals, produced by the collision between water vapour and energetic electrons in the pulsed plasma creeping on a water surface, are responsible for the decomposition of phenol in the solution for all kind of background gases. It is probably that OH radicals, produced by N_2 molecules excited in metastable state ($N_2(A^3\Sigma_u^+)$), and O_3 assist the phenol decomposition in pure N_2 and in pure O_2, respectively. In N_2-O_2 mixture, the decomposition rates of phenol stay at lower values, since NO_x reduces O_3 concentration and inhibits the O_3 production. In Ar-O_2 mixture, the decomposition rate of phenol increases with an increase of Ar mixture-ratio; therefore, Ar atoms excited in metastable states (Ar(4^3P_2), Ar(4^3P_0)) are responsible for the decomposition of phenol at higher mixture ratio of Ar.

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Date submitted: 17 Jun 2008

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