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State-by-state spectra fitting tool for highly-non-equilibrium plasmas: discharge in contact with water[1] TOMAS HODER, JAN VORAC, PETR SYNEK, Masaryk University, Brno, Czech Republic — Recently, the interest in discharges in contact with water increased enormously. Often, the discharges are ignited in a noble gas and the atoms and water fragments are the only available spectral signature. In such cases, the spectrum of hydroxyl radical may seem attractive for neutral gas thermometry. This contribution brings an extensive analysis of OH(A-X) spectrum obtained on special case of kHz driven surface DBD in contact with water. We have observed a spectrum that can be interpreted as a superposition of emission from several groups of OH. We have distinguished three groups - *cold group*, best observable for low N' quantum numbers, *hot group*, best observable for higher N' quantum numbers and the third group influenced by iso-energetic vibrational energetic transfer OH(A,v'=1 ->v'=0), best observable for $8 < N' < 14$. The data was processed by the novel method of state-by-state fitting. This approach combines spectral simulation and traditional Boltzmann plot construction procedure. A synthetic spectrum is simulated for each rovibronic upper state, including the instrumental broadening and matched with the measurement. This functionality was incorporated to the massiveOES software.

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