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The dissociative electron attachment (DEA) spectra of saturated compounds (*i.e.*, without double and triple bonds) containing the O and N atoms have recently been shown to be generally dominated by Feshbach resonances with double occupation of Rydberg-like orbitals around a cationic core [1]. These resonances shift to lower energies with alkyl substitution, in contrast to the shape resonances, and are found at surprisingly low energies in amines. Feshbach resonances have been identified already earlier as being responsible for DEA in water [2], ammonia [3], and other molecules [4, 5, 6].

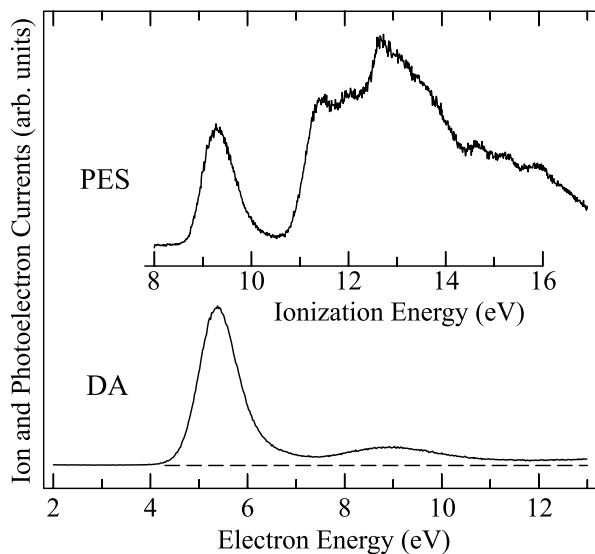


Fig. 1. Dissociative attachment spectrum (yield of the  $(M-1)^-$  anion, bottom curve) and photoelectron spectrum (top) of *tert*-butyl amine.

This type of processes has gained interest recently in connection with the low-energy electron-driven chemistry encountered in radiation damage to living tissue and with plasma

processing in material science. We therefore continue this work with the aim of gaining fundamental insight into the dynamics of dissociation of the Feshbach resonances. We study the dependence of the dissociation patterns on the energy of the resonance and the type of alkyl substitution of the amines. An example is shown in figure 1. The first photoelectron band, shifted to the left by 3.92 eV, corresponds to the first band in the yield of the  $M-1$  fragment, a strong indication that the DA band is due to a Rydberg-like Feshbach resonance. The 3.92 eV are the binding energy of the two electrons in the Rydberg-like orbitals around a cationic core.

We plan to extend the studies to compounds containing several heteroatoms and thus having two grandparent cationic states split by the competing *through-bond* and *through-space* interactions [7, 8].

## References

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