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UV excited electronic state decomposition of energetic materials and model systems using fs laser spectroscopy MARGO GREENFIELD, YUANQING GUO, ATANU BHATTACHARYA, ELLIOT BERNSTEIN, Colorado State University, Chemistry Department — Time resolved (fs) photodissociation experiments have been performed in efforts to elucidate the dynamics controlling the excited electronic state decomposition of the energetic materials RDX and HMX and their associated model systems (dimethylnitramine, nitropyrrolidine, nitropiperidine, and dinitropiperazine). The initial decomposition product of the energetic materials and model systems is the NO molecule. Femtosecond pump-probe techniques have been employed to measure the photodissociation dynamics of these systems via the initial NO product at three wavelengths (226 nm, 228 nm, 230 nm). The NO molecule has a non-resonant two-photon absorption at 228 nm and 230 nm and single photon resonant absorption for the $A^2\Sigma \leftarrow X^2\Pi(0,0)$ transition. Both pump-probe transients at non-resonant absorption and resonant absorption wavelengths indicate the dynamics of the energetic material's decomposition from the excited electronic state is faster than the time duration of our laser pulse (180 fs) and notably different from some of the model systems.

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