The interplay between laboratory spectroscopy and observational astronomy has allowed for the chemical complexity of the interstellar medium (ISM) to be explored. Our laboratory studies involve the measurement of the rotational spectra of commercially available samples in the region 75-110 GHz, thus covering a portion of Band 3 of the Atacama Large Millimeter/submillimeter Array (ALMA). Up until recently, we have concentrated on medium-sized (5 to 9 heavy atoms) nitrogen- and oxygen-containing molecules and their vibrationally excited states. Examples include amino alcohols, such as alaninol (2-amino-1-propanol), and cyanides. Further, we have extended the capabilities of our segmented chirped-pulse spectrometer [1] with electrical discharge apparatus. We present here the recent results from our set-up, including the typical rotational spectra of astrochemically relevant samples and the discharge-enabled rotational spectroscopy of mixtures of simple organic molecules. These experimental results have yielded transitions that will facilitate the detection of these molecules in the ISM with ALMA, and the discharge experiments should allow us to consider formation pathways of organic molecules from smaller building blocks.