OH/IR Star Color Mimics with S(25) > 100 Jy

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O-rich circumstellar dust shells that do not exhibit 1612 MHz masers (Lewis 1992), despite appropriate IR colors and 1612 MHz sensitivity, are known as OH/IR star color mimics. Since previous studies of mimics depend on samples with a limited IR spectral type and color range, we use the data collected for poster III-8 to identify the mimics in an all-sky sample of bright IRAS sources with S(25) > 100 Jy and (60-25) μm < 0.0: this expands on Gaylard et al. (1989), and benefits from the greater quantity of maser data now and a wider IR color range.

It is advantageous to use the S(25) > 100 Jy sources since their IR colors are as trustworthy as can presently be specified, and many of them have been examined at a variety of wavelengths. In poster III-8 we find (i) that the red limit to the predictable color range of OH/IR stars with S(25) > 100 Jy is well determined at (25-12) μm < +0.1; (ii) that the carbon or O-rich flavor of most shells can be determined from the LRS spectrum and/or complement of masers. And 1612 MHz observations are extant for all but 2 of the potential OH/IR stars with (25-12) μm > -0.5. Consequently most emission-line objects and pre main sequence (PMS) stars can be identified. It is also clear that while 1612 MHz detections are rare when (25-12) μm < -0.55, most of the blue objects exhibit other masers. We therefore limit our working definition of "mimics" to O-rich shells without 1612 MHz masers having +0.1 > (25-12) μm > -0.5, that are not PMS, emission-line or carbon stars.

This study identifies 17 mimics, of which two are presumptively proto planetary nebulae (PPN) with "odd" colors. Five of these exhibit mainline OH masers and three exhibit water masers, though < 50 % have been searched for either. Most mimics lie near the blue bound on their (25-12) μm color range, as did the LRS 2n-3n mimics in the Arecibo sky. There is no statistically discernible difference in the color distribution of O-rich mimics and OH/IR stars in color-color plots, except that there are very few red mimics. Since the ratio of 1612 MHz intensity to S(25) decreases in OH/IR stars as (25-12) μm gets bluer, the difference in this ratio between the mimics and OH/IR stars decreases markedly when estimated from extant, survey-quality 1612 MHz data. This suggests a need for more sensitive 1612 MHz observations of mimics to confirm the absence of emission to a more stringent level. Nevertheless so many mimics are already detected with mainline OH emission that they are unlikely to be simply normal OH/IR stars with weaker than usual 1612 MHz emission. The reddest IRAS sources with weak 1612 MHz masers, and hence small values of I_{1612}/S(25), are often PPN or PMS regions: neither attribution can explain the existence of the bluer mimics.

REFERENCES

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