NEAR-INFRARED CIRCULAR POLARIMETRY: IMPLICATION FOR ASTROBIOLOGY. J. Kwon[1] and M. Tamura[2], [1]National Astronomical Observatory of Japan (2-21-1 Osawa, Mitaka, Tokyo 181-8588, Japan; jungmi.kwon@nao.ac.jp), [2]University of Tokyo(7-3-1 Hongo, Bunkyo-ku,Tokyo, 113-0033, Japan; motohide.tamura@nao.ac.jp).

Magnetic fields have been thought for many years to play a crucial role in regulating accretion onto protostars, both in powering and shaping outflows and removing angular momentum from disk material. However, the precise role of the magnetic field is poorly understood and evidence for the shape and structure of the magnetic fields near the outflow regions has been difficult to obtain, although polarimetry is a technique that can certainly help. In this presentation, we show results from deep imaging linear and circular polarimetry of the NGC 6334 massive star-formation complex [1]. These observations show high degrees of circular polarization (CP), as much as 22%, ever observed. The CP has an asymmetric positive/negative pattern and is very extended (˜80" or 0.65 pc). Both the high CP and its extended size are larger than those seen in the Orion CP region [2]. By using 3-D Monte Carlo light-scattering models, we present the origin of high CP: the high CP may be produced by scattering from the infrared nebula followed by dust grains aligned with the magnetic field (dichroic extinction). Our results show not only the magnetic field orientation of around young stellar objects, but also the structure of circumstellar matter. This is the second case to support the large CP in scattering protostellar nebulae as a possible explanation for the extraterrestrial origin of homochirality of life on Earth. In addition, we present our first CP survey results in star forming regions, also supporting the extraterrestrial origin. We have found that (1) the CP is ubiquitous in star forming regions, (2) the CP degrees are very high (>~20 %) in massive star forming regions, (3) the CP extent is extensive (~0.1 pc) in massive star forming regions, (4) there is a clear trend between the CP degrees and the masses of young stellar stellar objects, (5) the dichroic polarization of scattered light is most likely the origin of large CP, and (6) these may support the CP in star forming regions as an origin of the biological homochirality on Earth, as proposed for the Orion nebular.

References:

[1] J. Kwon et al. (2013) *ApJ, 765,* L6(6pp). [2] T. Fukue et al. (2009) *ApJ, 692,* L88-L91.