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HOWARD A. STONE

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HARVARD COLLEGE PROFESSOR

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Professor Rob de Ruyter van Steveninck
Biocomplexity Institute
Indiana University
Swain Hall West 117
Bloomington, IN 47405-7105

Dear Search Committee:

I am writing in response to your request for a letter of assessment of Professor Sascha Hilgenfeldt, who has applied for a faculty position in your department. Sascha is an outstanding researcher and I am confident he will also be a very good teacher. Although best known as a theorist (e.g. sonoluminescence and foams), he has established two experimental programs in the areas of acoustic manipulation of cells and vesicles and the structural properties of foams. He thinks deeply and broadly and I am confident he will compare with your best candidates. A significant aspect of his research program concerns medical uses of ultrasound and more recently the use of ultrasound-driven microbubbles for manipulating the motion and rupture of cells and vesicles and directing flows in microfluidic devices. This recent work I find particularly impressive and clever and I think he will fit well into a broad program in biophysics, bioengineering, chemical or mechanical engineering, applied mathematics or applied physics.

Sascha was a postdoc with me for two years. He worked with my group on understanding drainage of foams, coarsening of foams, and other dynamical phenomena in foams. He also continued work on sonoluminescence with Michael Brenner and Detlef Lohse and further developed his research in medical applications of ultrasound. With respect to sonoluminescence, I believe that it is generally accepted that Sascha, along with M. Brenner and D. Lohse, did more than any other group to provide rational explanations for many of the puzzling experimental observations, including a quantitative explanation for the light emission process.

Sascha is impressive. His publication list is comparable to that of much more senior colleagues. He writes beautifully, organizes his papers and talks extremely well, and has a broad understanding of a range of physical and mathematical principles. His recent work imaging foams, and understanding structural properties and the coupling with coarsening, is elegant and will be highly read in the physics and mathematics communities interested in foams and minimal surfaces. At last year's meeting of the American Physical Society's Division of Fluid Dynamics, he gave a talk illustrating experimentally and theoretically how a controlled level of shear stress could be applied to cells and vesicles by using an oscillating bubble trapped on a boundary. His talk this year showed how to extend these ideas into microfluidics. Sascha is one of the leaders in understanding bubble dynamics and its uses and I found the recent talks interesting with further avenues for microfluidics and biology-inspired and biophysics research clearly articulated.

Finally, Sascha has established an independent research group with theoretical and experimental components, has raised funds and identified new research directions. The experimental projects he has on-going are very interesting, and that is particularly valuable as it is combined with his outstanding abilities in theory. I am confident that he will compare with your best candidates.

Sincerely,

Howard A. Stone

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